AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . . Highlights of Indianapolis Race · · · · Precision Forging Turbine Blades · · · Five Renegotiation Meetings · · · Economy Run Analysis · · · Lincoln Engine Carriers · · · Powerplants for Helicopters

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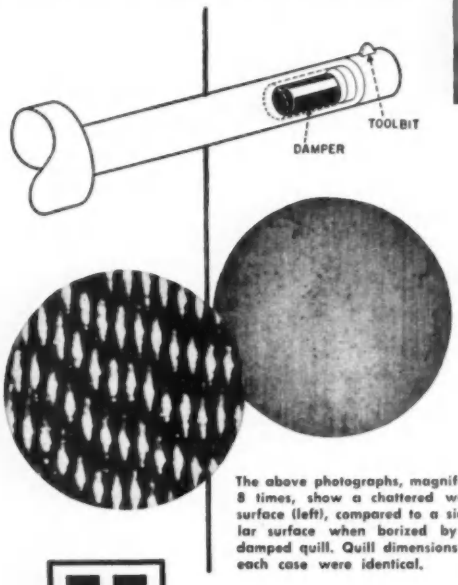
JUNE 15, 1952

A CHILTON PUBLICATION

Here's How Heald helps you get a finer finish on long-bore parts

On this Heald Model 221 Bore-Matic, damped quills help prevent self-excited tool chatter marks in the finish of long interrupted cuts. The parts, valve control bodies for ordnance work, are two-way borized, with the finish cut on the out stroke of the table.

damped quills help prevent self-excited chatter in many deep-hole borizing operations



The above photographs, magnified 8 times, show a chattered work surface (left), compared to a similar surface when borized by a damped quill. Quill dimensions in each case were identical.

● When the nature of the work requires boring bars and quills of unfavorable length to diameter ratio, self-excited vibration often causes objectionable chatter which is practically impossible to control by ordinary methods.

Heald engineers have developed an effective solution to this problem by combatting the vibration at its source — right in the quill itself. An air-cushioned plug or "damper" of heavy material, inserted into the work end of the quill has proved remarkably effective in reducing chatter on quills whose length-to-diameter ratios range from 3.5:1 to 8:1.

If you have a deep-hole borizing problem, this may be the answer. Remember — when it comes to precision finishing, it pays to come to Heald.

HEALD

Heald machines speed the nation's production

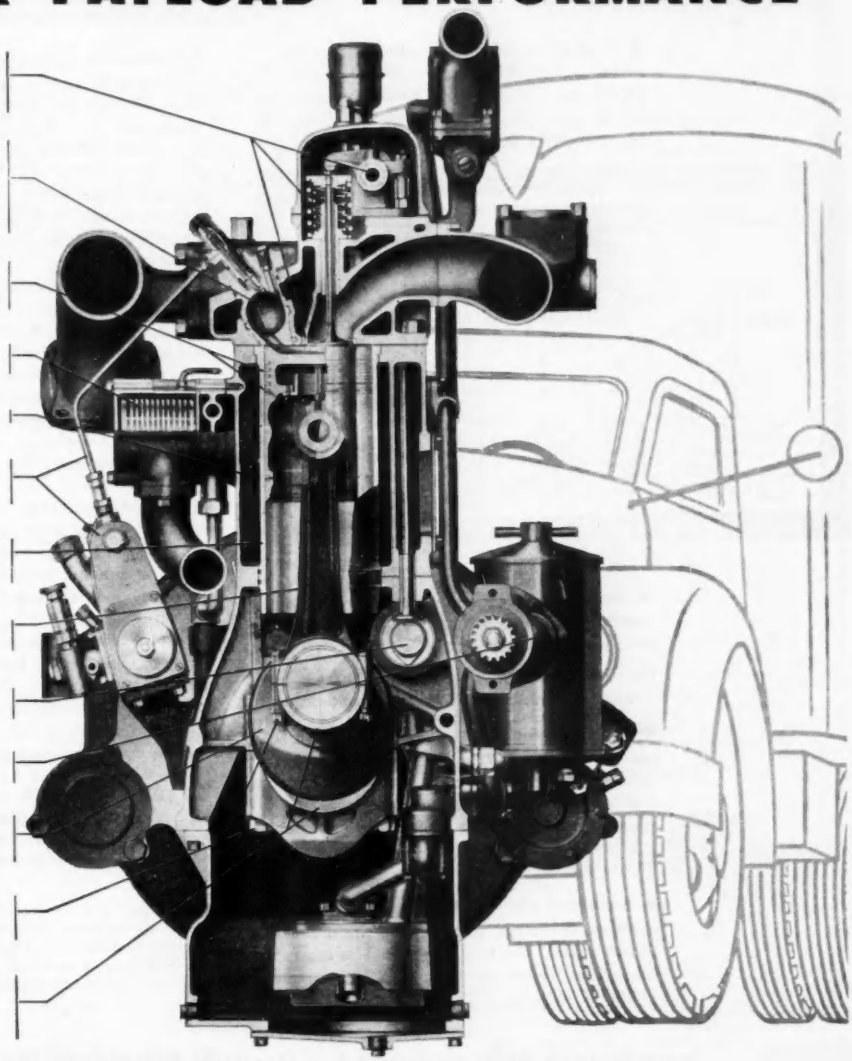
THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

WAUKESHA DIESELS

feature-packed truckers' engines for PEAK PAYLOAD PERFORMANCE



Waukesha High Duty Diesel, Model 148-DK—six cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement, peak hp 200. For full details, send for Bulletin 1532.

178

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • NEW YORK • TULSA • LOS ANGELES

MONEL

A general-purpose, corrosion-resisting alloy for applications that require a hard, tough, high-strength material

Monel® is a solid-solution alloy which combines high strength, ductility, fatigue strength, and toughness, with excellent resistance to corrosion. Its properties can be changed by cold working but it cannot be age hardened. It is slightly magnetic at room temperature and is non-magnetic above 110°-140°F.

The principal mechanical properties of Monel are:

● **Tensile Properties:** Hot-rolled Monel has a *minimum* yield strength (0.2% offset) of 25,000 psi., a minimum tensile strength of 70,000 psi., with an elongation (in 2 in.) of approximately 45%.

MECHANICAL PROPERTIES AND PHYSICAL CONSTANTS OF MONEL

MATERIAL	FORM AND CONDITION	AVERAGE MECHANICAL PROPERTIES: YIELD STRENGTH (0.2% offset) 1000 psi	TENSILE STRENGTH 1000 psi	Elongation in 2 in., per cent	HARDNESS BRINELL	AVERAGE PHYSICAL CONSTANTS: DENSITY lb./cu. in.	SPECIFIC GRAVITY	MELTING POINT °F	Specific Heat (32°-212°F.) Btu./lb./°F	Thermal Expansion Coefficient (32°-212°F.) 10⁻⁶ in./in./°F.	Thermal Conductivity (32°-212°F.) Btu./sq. ft./hr./°F./in.	Electrical Resistivity (32°F.) ohms/cir. mil ft.	Tensile Modulus of Elasticity 10⁶ psi.
Monel (wrought)	Annealed	35	75	40	125	0.319	8.84	2370-2460-	0.13	7.8	180	290	26
	Hot-rolled	50	90	35	150								
	Cold-drawn	80	100	25	190								
	Cold-rolled	100	110	5	240								
Monel (cast)	Sand-cast	35	80	35	135	0.312	8.63	2400-2450-	0.13	6.8	180	320	19

● **Toughness:** Due to the coexistence of high ductility and high strength, Monel is one of the toughest alloys.

Charpy impact valves vary from 220 ft.-lb. for hot-rolled Monel, to 150 ft.-lb. for cold-drawn.

● **Spring Properties:** Monel spring wire can be used under corrosive conditions and at temperatures up to 400°F. For wire sizes heavier than 0.057-in. diameter, design of springs is based on a torsional modulus of 9,500,000 psi. and stresses of 45,000 psi. for average service, and 35,000 psi. for severe service.

● **Endurance Limit:** In rotating beam tests of polished specimens at room temperature and 10,000 r.p.m., Monel (cold-drawn, as-drawn) showed an endurance limit for 10^8 cycles of 40,000-47,750 psi.

● **Low-Temperature Properties:** Monel has excellent properties at sub-zero temperatures. Data shows that strength increases, without appreciable change in ductility, hardness or impact strength. Cold-drawn Monel at −110°F. had a tensile strength of 117,450 psi., a yield strength of (0.20% offset) of 100,850 psi., and charpy impact strength of 178 ft.-lb.

● **Working Characteristics:** Monel can be forged in practically any shape forgeable in steel. Recommended temperature for heavy-hammer forging and drop forging is 2150° to 1700°F. Hot working should be avoided in the range of 1700° to 1200°F. (If it is unavoidable, only light hot work should be done.) Monel behaves similarly to mild steel in mechanical cold working, as in cupping, drawing, swaging, die-forging, power hammering, bending and forming. Monel's high strength limits manual operations, such as spinning, bumping, and hand hammering, to easy shapes. Heavy work can be done by hand only with frequent anneals. Monel is satisfactorily machinable but due to its toughness, cutting speeds are somewhat slower and feeds lighter than those for mild steels. It can be joined by the usual welding, brazing, and soldering processes.

● **Corrosion Resistance:** Monel is highly resistant to attack by most commonly encountered corrosives, including neutral and alkaline salts, salt water, mineral acids, alkalies, organic acids and compounds, and wet and dry gases.

● **Forms Produced:** Monel is supplied in most commonly used mill forms—rods, hexagons, squares, rounds, flats, strip, sheet, seamless tubing, wire, welding materials—and in a variety of finishes and conditions. It is also produced in sand, centrifugal and precision casting.

FOR ADDITIONAL DATA

Write for your free copy of Technical Bulletin T-5, "Engineering Properties of Monel and 'R' Monel." It contains all essential engineering information on these alloys.

Nickel alloys are being increasingly diverted to defense applications. However, technical help for metal problems involving corrosion, high temperatures or fatigue is available from Inco's Technical Service, either for immediate defense needs or for future installations.

INCO Nickel Alloys

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL • "S"® MONEL
NICKEL • LOW CARBON NICKEL • DURANICKEL®
INCONEL® • INCOLOY® • INCONEL "X"®

AUTOMOTIVE INDUSTRIES

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Contents

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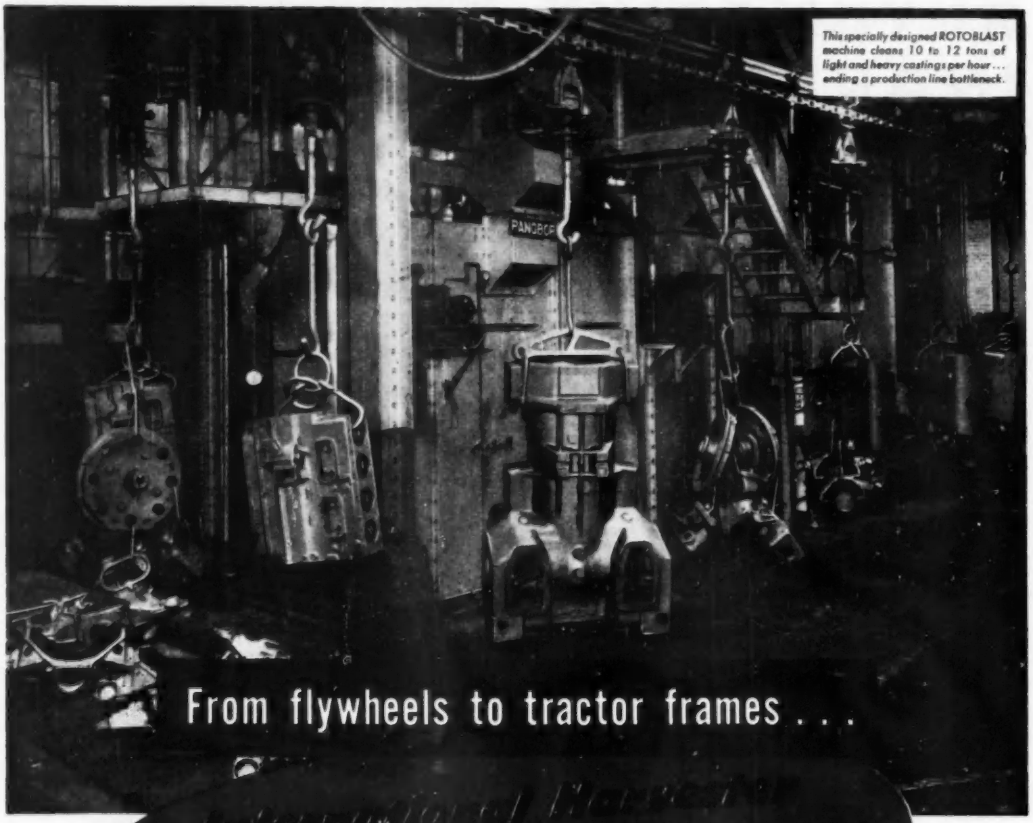


This specially designed ROTOBLAST *machine cleans 10 to 12 tons of light and heavy castings per hour . . . ending a production line bottleneck.*

From flywheels to tractor frames . . .

International Harvester cleans 10-12 tons per hour with

PANGBORN ROTOBLAST®

AT the International Harvester Company's Tractor Works Foundry, the blast rooms and tumbling mills couldn't clean tractor frames, engine blocks, transmissions and bolsters fast enough to keep pace with production. Pangborn engineers were called in . . . they studied the problem . . . and designed the special blast cleaning machine you see here. Automatically handling smaller light work and heavy pieces simultaneously, it ROTOBLASTS 10 to 12 tons per hour. No bottleneck here!

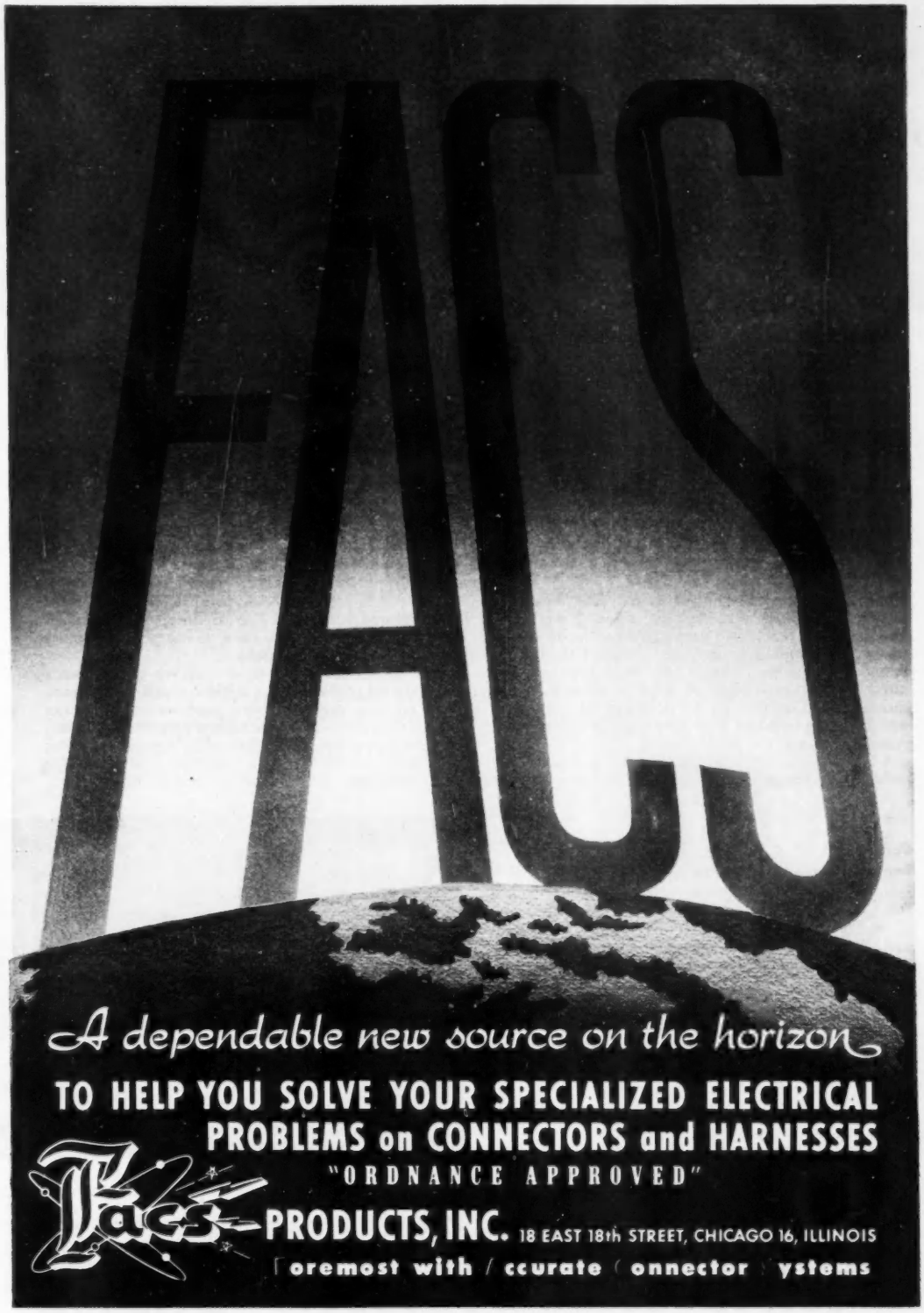
Find out how Pangborn can help you speed production and *save money too!* No matter how large or small, light or heavy your castings, there's a modern, economical, efficient ROTOBLAST Barrel, Room, Table or Table-Room to solve your blast cleaning problem. For the complete facts, write today for Bulletin 214. Address: PANGBORN CORP., 3900 Pangborn Blvd., Hagerstown, Maryland.

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job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A dependable new source on the horizon
TO HELP YOU SOLVE YOUR SPECIALIZED ELECTRICAL PROBLEMS on CONNECTORS and HARNESSES
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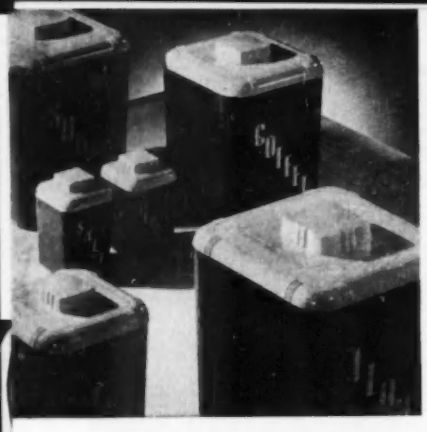
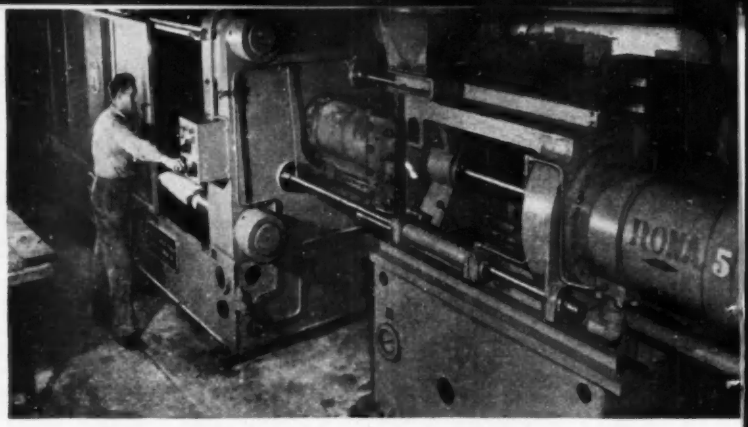
Facs PRODUCTS, INC. 18 EAST 18th STREET, CHICAGO 16, ILLINOIS
Foremost with Accurate Connector Systems



NO MORE PROBLEMS. The production of plastic household items by Rona Plastic Corporation was slowed down by an inadequate hydraulic oil. A switch to Sunvis 999, over a year ago, restored it to normal.



PRESSURE LOSSES ENDED. There are few plastic molding machines as big as this 60 ounce model. It exerts a pressure of 1,000 tons. Because the hydraulic oil formerly used sludged up and thinned out, it could not maintain this pressure. But Sunvis 999 has fully met these severe requirements, as well as those of Rona's nine other hydraulic machines of varying sizes.

PLASTIC MOLDER'S BOTTLENECK ENDED BY SUNVIS HYDRAULIC OIL

More than a year ago Rona Plastic Corporation, New York City, had trouble with its hydraulic molding machines. The machines functioned erratically due to oil sludge sticking the control mechanisms. In addition, the oil thinned out excessively at normal operating temperatures, and resulted in the loss of proper clamping pressures on the dies. To keep the machines going at all, it was necessary to drain, clean, and entirely recharge the systems at frequent intervals.

A Sun representative, called in by Rona, studied the problem and recommended Sunvis 999. He knew it would put an end to pressure losses, because, even at elevated temperatures, it does not decrease in viscosity as much as most other oils. He also knew its exceptional stability would end the sludging problem.

Sunvis 999 proved to be the answer to all Rona's hydraulic oil problems. The original charges, with minimum make-up, are still giving good service. Rona can expect the same performance for a long time to come, because experience shows that under normal operating conditions, Sunvis 900 Series Oils are *good for the life of the equipment.*

Department AA-6
Sun Oil Company, Philadelphia 3, Pa.

I am interested in knowing more about Sun Hydraulic Oils. ☐ I would like to consult with a Sun representative. ☐ Send the booklet "Hydraulic Fundamentals and Industrial Hydraulic Oils."

Name_____

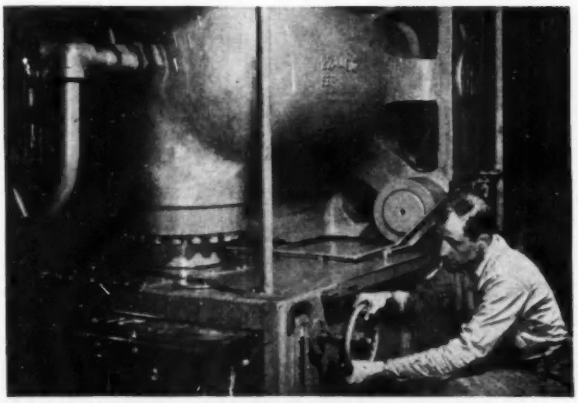
Title_____

Company_____

Address_____

City_____ Zone_____ State_____

TECHNICAL ASSISTANCE AVAILABLE. Sun's engineers are at your service for consultation on all hydraulic oil applications. It will pay you to utilize the experience they have gained in solving a wide variety of problems in many different industries.

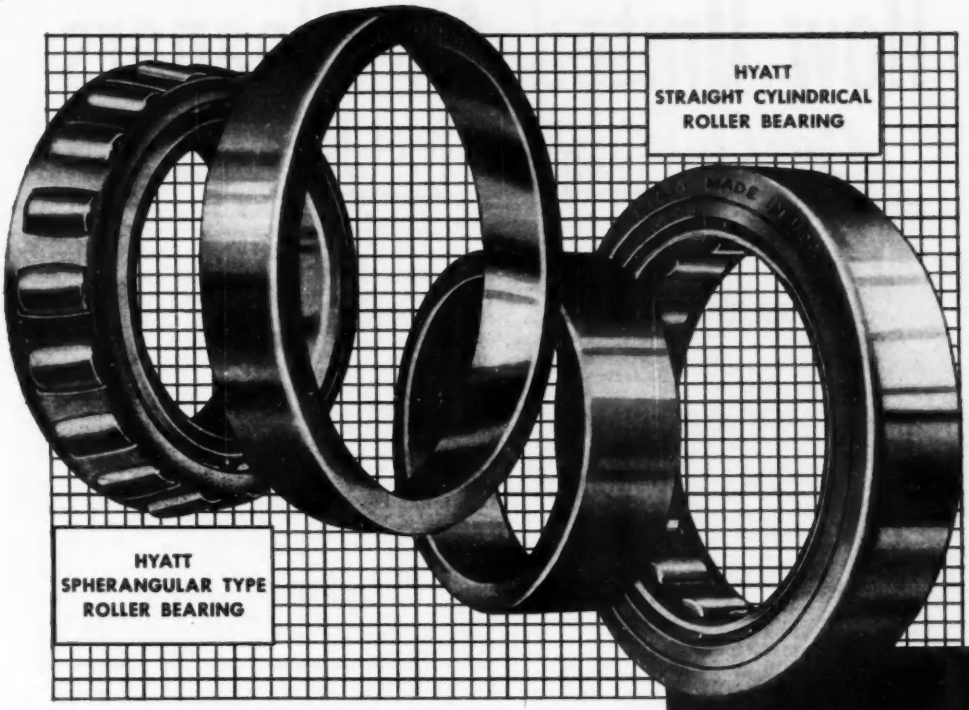


NO OIL CHANGES HAVE BEEN NEEDED. Before Sunvis 999 was adopted, the oil in each of the machines had to be changed frequently (the one pictured holds 450 gallons). The original charges of Sunvis 999 have been in use now for more than a year.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

SUNOCO®



We've learned a lot about roller bearings and their application in the past fifty-nine years.

In the automotive field, Hyatt was in at the birth of the industry—has grown with it—developed an unequaled testing laboratory—improved product design—continued research relating to materials and methods to keep Hyatt Roller Bearings ahead in the high quality and precision necessary for the perfect performance in cars, trucks and buses of today.

In such an ever-changing industry, Hyatt's duty is to anticipate your application requirements of tomorrow. So, Hyatt invites you to make use of its long experience in the manufacture of better roller bearings. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey and Detroit, Michigan.

A fund of HYATT experience is yours to use

HYATT ROLLER BEARINGS

How United Air Cleaners Get Outside Air Inside the Engine

High under-the-hood temperatures that cause vapor lock can be a real headache to truckers — particularly when high summer temperatures aggravate the situation. That's why United Specialties air cleaner designers working in close cooperation with Diamond T engineers developed a special oil bath air cleaner to combat this condition.

This air cleaner is mounted on the inside of the hood ventilating louvers in such a way that *cool outside air* is drawn into the carburetor instead of hot under-hood air. Thus the United Oil Bath Air Cleaner not only provides air that is over 99 percent dirt free, but also aids in eliminating vapor lock.

The above case is typical of many instances where United Specialties engineers are called upon to provide specialized air cleaner service. It is one of the reasons United builds over 260 different air cleaner models. We invite *your* inquiry.

Here is Diamond T truck Model 720 which is equipped with the louver-mounted air cleaner illustrated. United Specialties Company, working closely with Diamond T engineers, have pioneered in air cleaner designs utilizing outside-the-hood air.

UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION • CHICAGO 28
MITCHELL DIVISION • PHILADELPHIA 36
BIRMINGHAM 11, ALABAMA

★ AIR CLEANERS ★ METAL STAMPINGS ★ DOVETAILS
★ IGNITION AND TURN SIGNAL SWITCHES ★ ROLLED SHAPES

...AY TO
...STEERING EASE

Ross Hydrapower—with the exclusive *cam and lever* principle—gives effortless, fatigueless power steering . . . in a compact, completely housed, integral assembly.

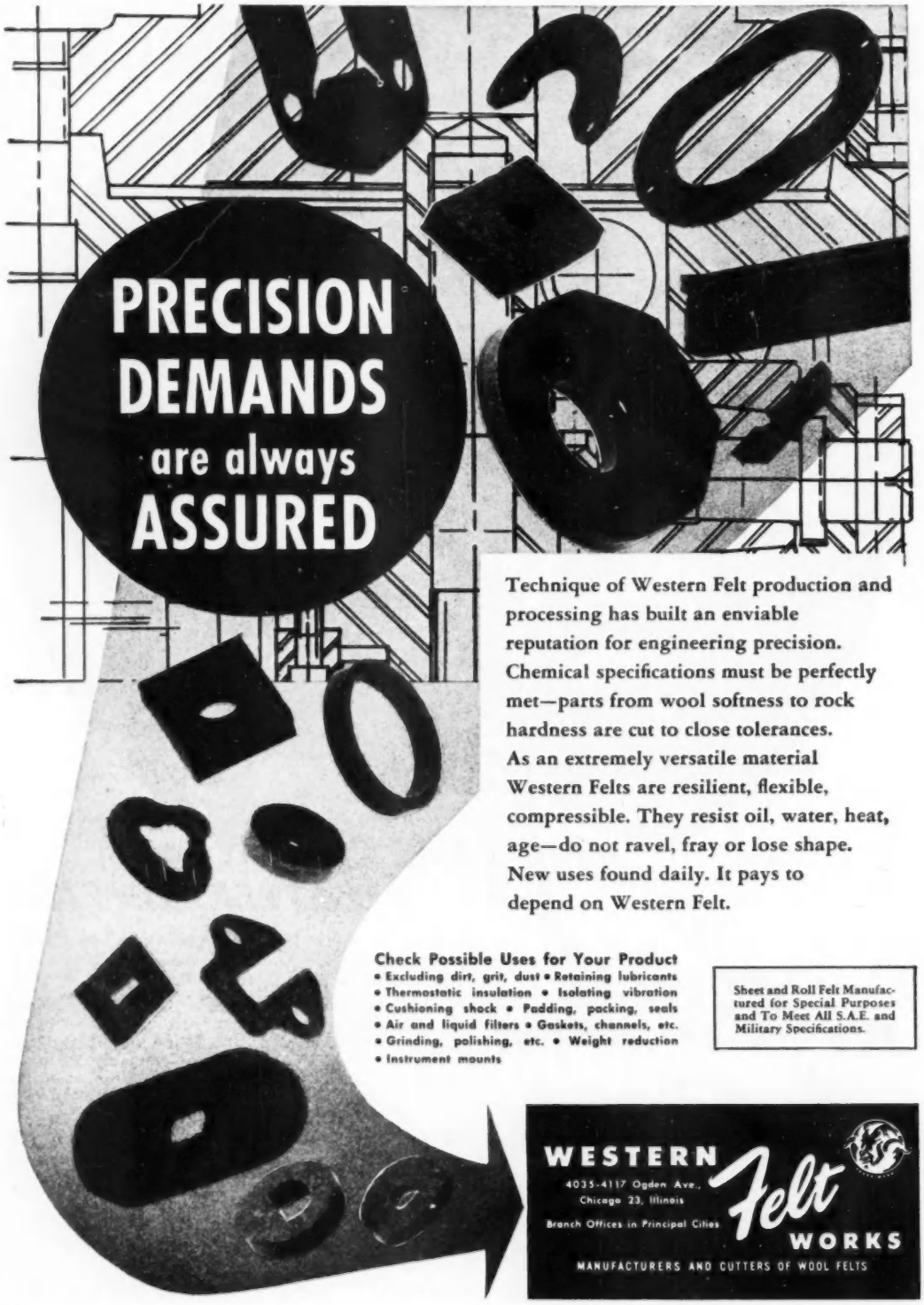
Ross Hydrapower's unusual versatility . . . and "tailor fit" adaptability to any steering problem . . . is shown by the eight typical assembly sketches above—four for *left*-hand and four for *right*-hand shaft outlet. Power cylinder can be rotated to any position . . . and valve can be assembled in four different positions—giving *maximum installation freedom* to avoid chassis interference.

Ross Hydrapower brings new steering *ease* and *satisfaction* to commercial vehicles and passenger cars alike. New driver *safety!* New payload *protection!* We invite discussion of any steering problem.

HYDRAPOWER Ross

Cam & Lever STEERING

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA



PRECISION DEMANDS are always ASSURED

Technique of Western Felt production and processing has built an enviable reputation for engineering precision. Chemical specifications must be perfectly met—parts from wool softness to rock hardness are cut to close tolerances. As an extremely versatile material Western Felts are resilient, flexible, compressible. They resist oil, water, heat, age—do not ravel, fray or lose shape. New uses found daily. It pays to depend on Western Felt.

Check Possible Uses for Your Product

- Excluding dirt, grit, dust
- Retaining lubricants
- Thermostatic insulation
- Isolating vibration
- Cushioning shock
- Padding, packing, seals
- Air and liquid filters
- Gaskets, channels, etc.
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- Weight reduction
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Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

WESTERN Felt WORKS

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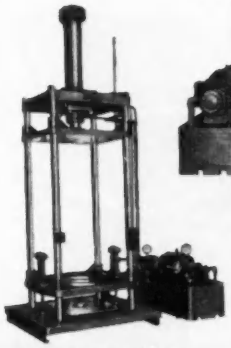
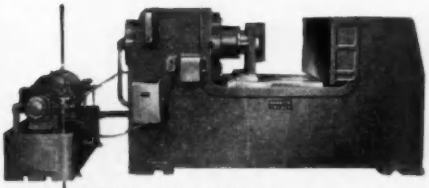
Branch Offices in Principal Cities

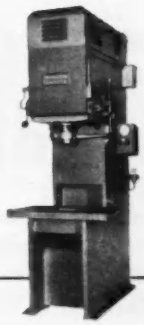
MANUFACTURERS AND CUTTERS OF WOOL FELTS



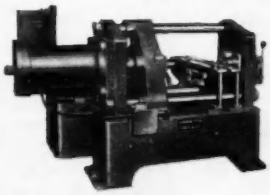
WATER HEATER TANKS are assembled with this 50-ton, 4-column press. Special hydraulic stripper plate raises tank from lower die after assembly.



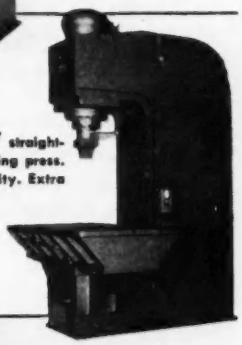
TRACTOR WELDMENTS for main frames and roller frames are straightened with this 100-ton press. Horizontal design permits use of hoist for easier handling.



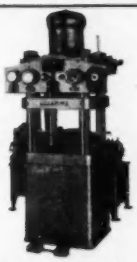
DIE CASTINGS are trimmed on this 25-ton, long stroke, open gap press. Controls reverse on distance; extremely high speed advance and return. Easy on dies. Scrap chute in table.



TRACTOR TRACK LINKS are press-fit assembled in this 50-ton, 3-column press. Assembly includes bushings and connecting pins. Press indexes for various sized links.



HEAVY DUTY straightening and forcing press. 150-ton capacity. Extra reach and large table permit handling heavy work.



HELICAL CUTTER BLADES are formed with this 75-ton, 4-column press. 2-step, timer-controlled operation forms part. Special attachment ejects part and relubricates dies with graphite.

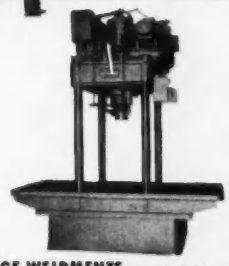
WHEN IT COMES TO PRESSES ...COME TO HANNIFIN

GENERAL PURPOSE 25-ton open gap press. Die cushion under table permits use for drawing operations.

FIBERGLAS PLASTICS are molded with this 50-ton, 4-column platen press. Automatic controls permit high-speed approach, slow closing on dies. Long stroke and extra "daylight" for deep parts.

When your production calls for hydraulic presses, investigate the Hannifin line that includes more than 75 standard models, capacities to 150 tons.

Quite probably you can select the press you need directly from the complete Hannifin catalog . . . or a Hannifin Field Engineer will demonstrate how easily one of these standard models can be modified to meet your requirements. Hannifin Corporation, 1143 South Kilbourn Ave., Chicago 24, Ill.



LARGE WELDMENTS are straightened on this 75-ton, 4-column press. Sensitive pressure control, extra large work table.

Hannifin Representatives Are at Your Service in These Leading Industrial Centers

Atlanta, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Houston, Los Angeles, Milwaukee, Minneapolis, Moline, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, Seattle, Richmond, Va.; Rochester, N. Y.; South Bend, Ind.; Washington, D. C.; Worcester, Mass. In Canada, F. F. Barber Machinery Co., Toronto, Montreal, Windsor, Hamilton, Vancouver.

HANNIFIN

Hydraulic Presses • Pneumatic Presses • Hydraulic Riveters
Hydraulic Cylinders • Air Cylinders • Air Control Valves

WRITE FOR BULLETIN 130

Hannifin Corporation
1143 S. Kilbourn Ave., Chicago 24, Illinois
Please send me Bulletin 130 on Hannifin Hydraulic Presses.

Name.....

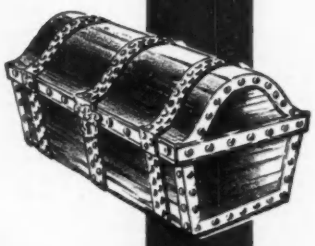
Position.....

Company.....

Address.....

City.....*State*.....

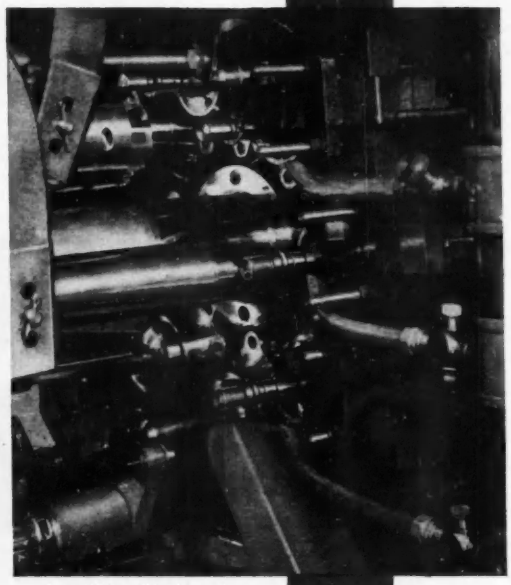
PIECES FROM EIGHTS



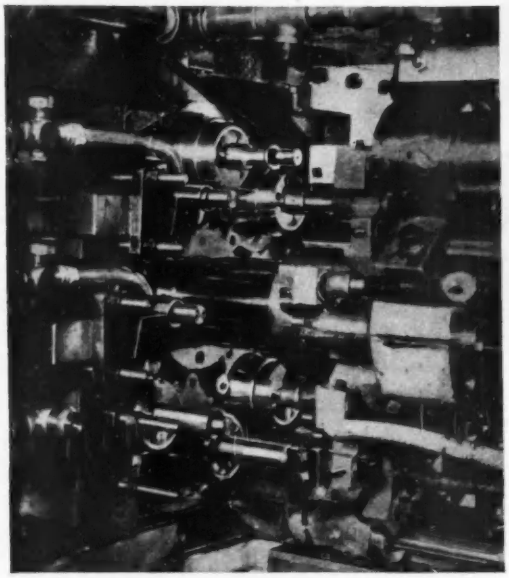
The first eight spindle bar automatics were introduced in 1930 by the late Frank L. Cone, founder of the Cone Company.

CONOMATIC Eights have had the usual opportunities available to any production tools that can handle added requirements and responsibilities.

With more tool positions than other "automatics", Eight Spindle CONOMATICS have an advantage in taking on, at one chucking, operations that save the costs of second handling.



Rear Side of Tooling Area



Front Side of Tooling Area

The milling and stamping operations performed by the 1⅝-EIGHT, on the piece shown, did not require stopping the spindle. The dependable performance of CONOMATICS makes such money-saving operations well worthwhile.

A Comparison of ALL Automatics is in favor of Cone

Conomatic **CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.**

Unique production processes build Extra quality into Eaton Valve Seat Inserts

Years of production experience and close engineering cooperation with leading engine manufacturers, combined with modern high-volume facilities, enable Eaton to furnish high-quality valve seat inserts to meet the specific requirements of the automobile, truck, and tractor industries. The range covers all types of inserts from low-priced, volume production passenger car inserts up to large-size, puddled-face inserts of suitable materials for large heavy-duty installations. A unique method of puddling special facing materials on insert seats enables Eaton to furnish inserts with superior corrosion and wear-resistant qualities at minimum cost.

You can utilize Eaton's long experience in this field by giving our engineers an opportunity to work with yours in the early stages of design.

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

THE INDUSTRY'S FINEST POWER BRAKING SYSTEMS

on Highways Everywhere!

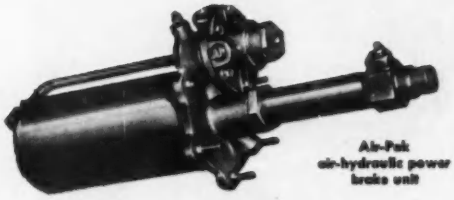
Regardless of the size of vehicle or whether the preference is for vacuum or air, the trucking industry has come to look to Bendix Products as the one source uniquely qualified to meet every power braking need.

Hydrovac, the world's most widely used power brake, is the undisputed leader in the vacuum-hydraulic field. And Air-Pak is recognized as foremost in the field of air-hydraulic power braking units.

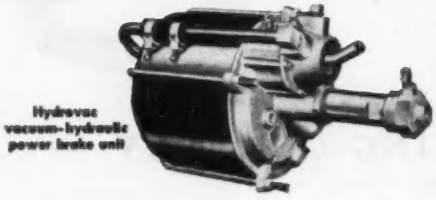
Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in *both* the vacuum and the air actuated units, brakes can be applied instantly by foot power *alone*—a constant safety factor of tremendous importance.

That's why on highways everywhere the preference is for Bendix Hydrovac* or Bendix Air-Pak, the Industry's Finest Power Braking Systems.

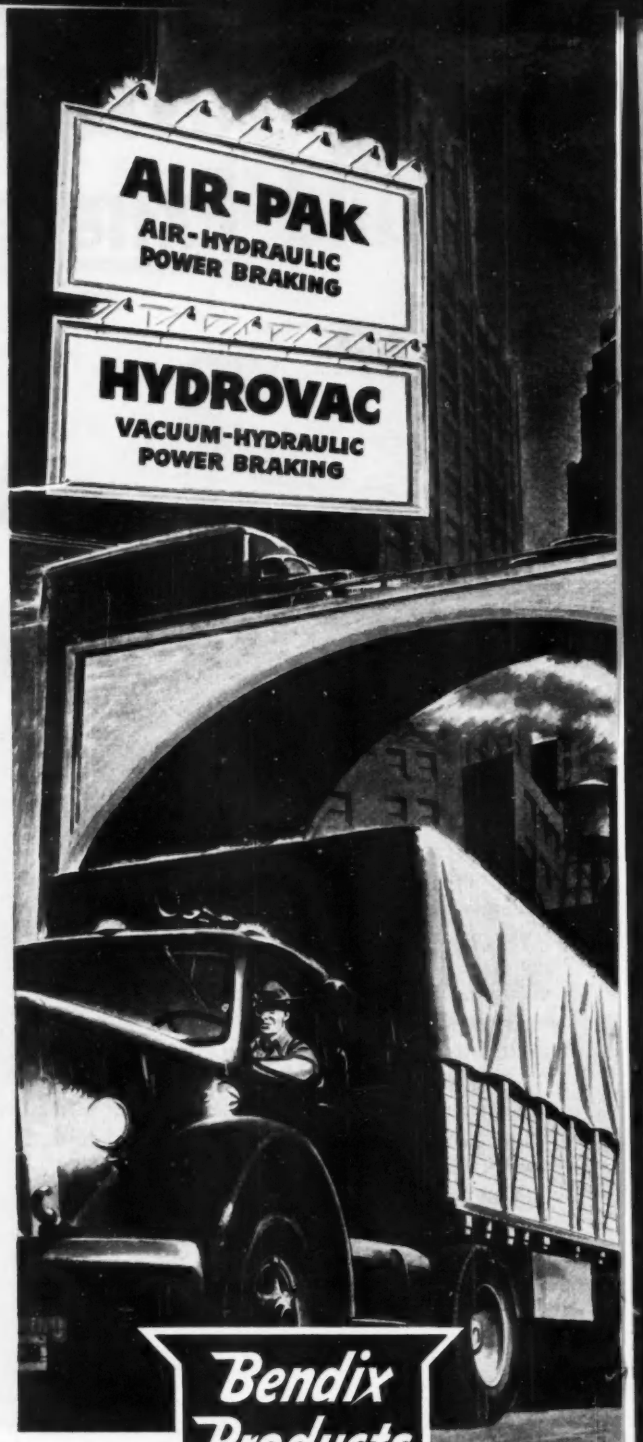
*REG. U. S. PAT. OFF.



Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit



Bendix Products Division

BRAKING HEADQUARTERS for the AUTOMOTIVE INDUSTRY

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AVIATION CORPORATION

AUTOMOTIVE INDUSTRIES

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Cable Address Autoland, Philadelphia

High Spots of This Issue

FOR Free Literature and Information on New Equipment and New Products, use postage-free reply card on page 65.

Precision Forging of Turbine Vanes, Blades, and Buckets

Packard Motor Car Co. is busily engaged in setting up equipment for the mass production of turbine parts by advanced methods. While mainly conventional means must be employed in the interim, a peek at plans for the future is revealing. Page 34.

Helicopter Powerplant Analysis

The recent annual meeting of the American Helicopter Society was spiced with absorbing reports of development and research progress. Portions of three papers on gas turbines and reciprocating engines, Air Force projects, and short-haul helicopters are printed. Page 36.

Renegotiation Conferences in Five Industrial Centers

Continuing its efforts to aid companies in solving defense contract renegotiation problems, AUTOMOTIVE INDUSTRIES recently held five more conferences on the subject. A review of the main points made at the meetings for the guidance of executives is given. Page 38.

Another Fastest Five Hundred

Roaring engines and squealing tires again broke previous records at this year's 500-mile Indianapolis Race. A lap-by-lap description of the classic, plus a detailed mechanical analysis of notable car designs, engines, parts, etc., is presented. See Page 44.

Lincoln Engines Built and Tested on Special Carriers

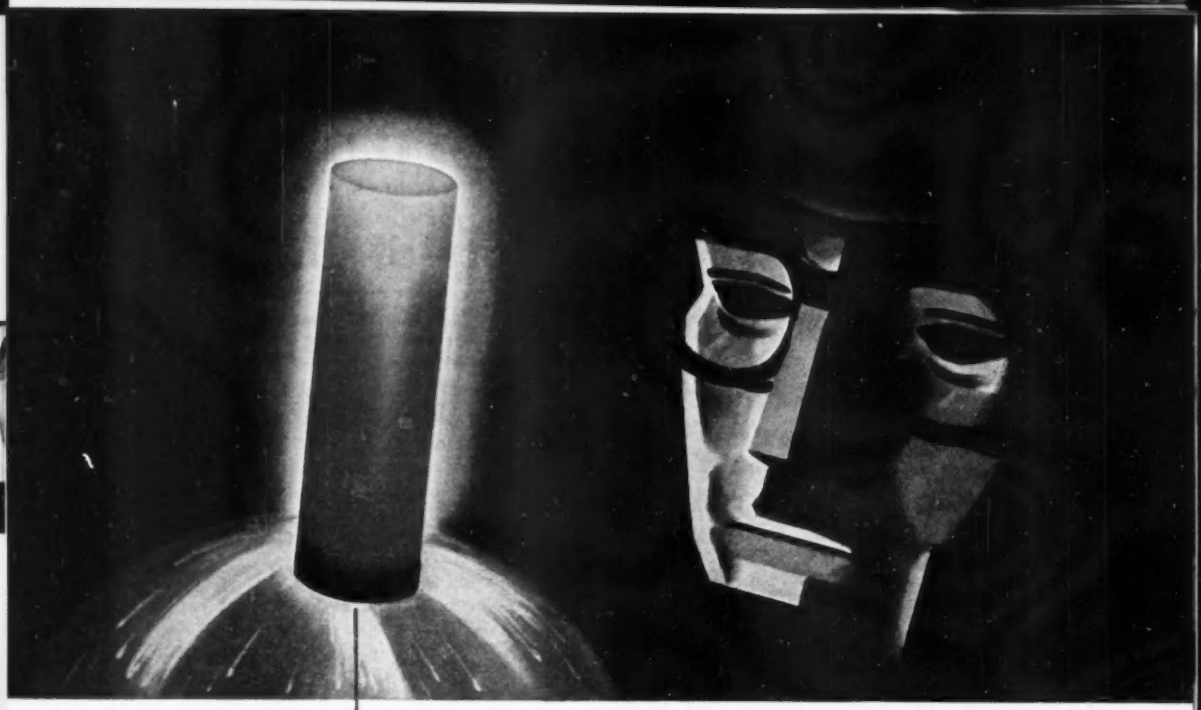
The principle of automation, one of Ford Motor Co.'s chief enthusiasms, is now operating in full vigor at the Lincoln plant in Dearborn, Mich. Each engine picks a single carrier on the conveyor system as a mate and remains wedded to it all down the line. Page 52.

22 New Product Items And Other High Spots, Such As:

Strangling the free competitive system; testing electrical units with self-contained diagnostic equipment; highlights of the 1952 Economy Run; and a muffler of improved design for high-compression engines.

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT



Cold water strikes red hot metal in end-quench hardenability test—first step in Ryerson quality control.

RED HOT REASON for Buying Ryerson Alloys

There is no question about it—our end-quench hardenability tests certainly simplify your job of buying and heat treating today's interim and lean alloys. With the hardenability of your particular steel thus definitely determined, the other mechanical properties can also be predicted—with confidence.

These hardenability tests are but one step in a unique program that makes Ryerson alloys easier to buy and safer to use. Starting with careful selection of every heat carried in Ryerson stock, the plan follows clear through to the certification of analysis and hardenability that is sent with every shipment of as-rolled or annealed Ryerson alloy steel.

Now more than ever this Certified Plan makes Ryerson your best source for alloys. Though defense demands are taxing even our extensive facilities we can undoubtedly take care of most of your requirements. So for quick shipment of pre-tested alloy steels which you can buy and heat treat with confidence, call the nearest Ryerson plant. And remember we also carry heat treated alloys in stock for immediate shipment.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot & cold rolled, many types & coatings
TUBING—Seamless & welded, mechanical & boiler tubes
ALLOYS—Hot rolled, cold finished, heat treated
STAINLESS—Allegheny bars plates, sheets, tubes, etc.
TOOL STEEL—Oil and water-hardening types, ground flat stock
REINFORCING—Bars & Accessories, spirals, wire mesh
MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 106, No. 12 June 15, 1952

Automobile Workers Gain Three-Cent Hourly Raise

Wage costs in the automobile industry are going up three cents an hour as a result of an adjustment in cost of living allowances and the annual four cents an hour improvement factor. Due to a slight drop in the cost of living, wages are reduced one cent an hour, but the four-cent improvement factor brings the net gain to the workers to three cents an hour.

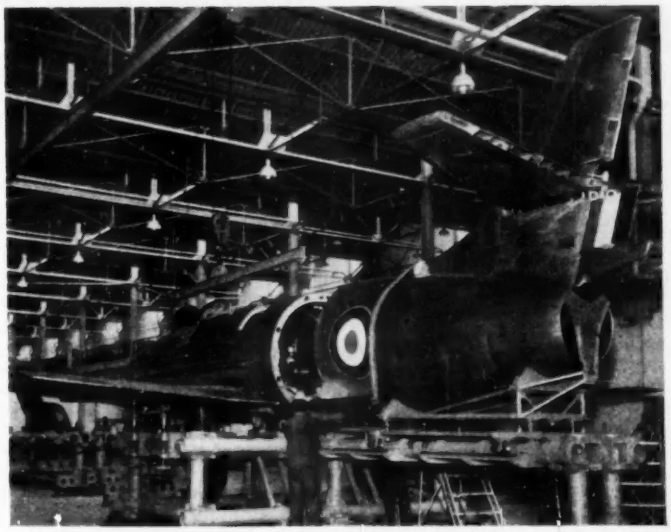
In view of higher wage costs, higher freight rates, and prospective increases in the cost of steel and copper, automobile manufacturers are studying costs in relation to selling prices. Under OPS regulations, the four-cent annual improvement factor cannot be claimed as a higher cost in asking for price increases, but the other factors are legitimate. Of course, it is not yet known how much steel prices will go up as a result of higher wages that are certain to come in the industry.

Copper prices will go up on that portion of metal imported from other countries under the new agreement with Chile, and 80 per cent of the higher cost may be recovered. However, it is difficult to determine how the amount of foreign copper going into automobile items will be segregated.

Although prices and production costs are being studied, it would seem that it will be a while yet before any definite move is made, particularly since it will require clearance through OPS to increase vehicle prices.

Budd Tank Plant to Open Shortly

The new Budd Co. tank plant in Philadelphia, Pa., will be formally opened June 27. The ceremonies to be held in conjunction with the opening will be attended by business leaders from the Philadelphia area.



FRENCH JET AIRCRAFT FACTORY

The mid-section of a jet plane is lowered into place by an overhead electric crane on the assembly line of an Avions Marcel Dassault factory. The French firm was responsible for the design of the Mystere jet fighter, which reportedly has exceeded speeds attained by British and U. S. planes. Although propeller-driven aircraft are also in production at the moment, full-scale jet output is expected shortly.

Nash, Packard Deny Report of Merger

The recent election of James J. Nance as president by the Packard Motor Car Co. board of directors has stirred up rumors that one of his assignments would be to effect a merger between Packard and Nash.

Both companies deny the validity of the report, and the possibility would seem to be remote at this time. In 1949, merger possibilities between these two companies were studied seriously, but the idea was abandoned.

Since that time, Nash has expanded its production facilities enough to eliminate one of the principal reasons for looking at a merger three years ago. The situation at Packard also has altered so that a tie-up with Nash probably would not have the same possible advantages as before.

Detroit to Hold Annual 250-Mile Stock Car Run

Detroit again will hold a 250-mile stock car race, scheduled for June 29 and sponsored by the Detroit Junior Board of Commerce. Entries will be limited to 1951 and 1952 models.

It is estimated that 50 cars will be in the race after a week of elimination trials, with the fastest car of each make qualifying automatically. The winner receives $5000, plus the pace car, a 1952 Nash Ambasador.

News of the AUTOMOTIVE

Improved Methods for Handling Scrap Prime Topic of Discussion at Recent MHI Meeting in Chicago

The second User-Manufacturer Symposium of the Material Handling Institute, held in Chicago, Ill., recently, was concerned with better methods of scrap handling. These conferences represent a new approach to the problems of materials handling in that a number of user representatives present specific problems and seek practical solutions through discussion with experts from the materials handling field.

A Ford Scrap Problem

Typical of the activity of this group was the problem of dealing with the proper disposal of scrap sheet metal and trimmings originated in the Ford Motor Co. press shop at Buffalo, N. Y. The major question is how to feed the two balers at the end of the line so as to maintain a smooth flow of scrap, without blocking the presses and without creating idle time at the balers. Due to variations in the size and form of the sheet metal scrap, there is also the problem of accumulating sufficient stock at one time to assure development of scrap bales weighing 1200 lb apiece.

After a barrage of ideas across the table, the idea of installing a weighing platform ahead of the balers so as to assure proper weight of the load, regardless of bulk, was recommended for study. In order to assure sufficient material ahead of the balers at all times, study will also be made of the possible use of supplementary hoppers or special buckets in which scrap loads are to be accumulated, in addition to the usual flow of scrap on the belt conveyors feeding to the balers.

Caterpillar Problems

A Caterpillar Tractor Co. representative brought up a number of problems which resulted in a discussion of palletizing, unit loading, and the general question of the most economical methods for handling raw and finished parts. It was brought out in the discussion that palletizing of raw materials, such as castings and forgings and even some finished assemblies, has been discarded in favor of shipping such materials loosely in cars and trucks.

It was pointed out that versatile industrial fork trucks are now being equipped with scoops of special design which make it possible to unload the loose parts quickly and economically. As such parts are unloaded, they are placed in steel containers used within the plant and from that point on are transported in unit loads. Up to a few years ago, many plants made it mandatory for suppliers to palletize all shipments of this character for easier handling.

Shipments of Large Parts

One automobile manufacturer was said to have developed a technique for shipping large parts, such as body quarter panels, trunk lids, roof panels, hoods, etc., without resorting to special containers or bundling. These parts are stacked on special racks made up of sections of pipe, then lifted by means of a fork truck with a special fixture in front. The blade comes under the rack to lift while a pivoted arm hooks over the top front end of the load.

Originally, this method had shortcomings due to the fact that each type of part required a different fixture. More recently, however, a line of quickly interchangeable fixtures has been developed which can be replaced in a matter of a few minutes.

Ford Gets Additional Tank Engine Order

Ford Motor Co. has been awarded a supplemental contract for $16.5 million worth of tank engines and spare parts. The new order brings the company's contracts for these items to about $40 million.

The Ordnance Corps also has announced that it has awarded $336,337 to Oldsmobile Div. of General Motors Corp. to convert facilities for a newer type artillery weapon.

GM Plans Auto Show at New York in 1952

General Motors Corp. is going to resume its automobile show in New York next January. It is understood that an extensive engineering show will be staged along with the display.

THIRD WILLYS PASSENGER CAR

The Aero Lark is the third model in the 1952 Willys-Overland Motors, Inc., passenger car line. Basically similar to its companion models, the Aero Ace and Aero Wing, the two-door, six-passenger car is powered by a six-cyl, 72-hp "Lightning 6" engine.

AND AVIATION INDUSTRIES

Chrysler Set to Run Detroit Tank Plant

Chrysler Corp. has signed a contract to take over operation of the Detroit Arsenal within the next 60 days. A study will be made to determine the facilities and responsibilities which Chrysler will assume when it takes over the operation of the Tank Plant on a cost-plus-fixed-fee contract basis.

Under the agreement, Chrysler will make its own arrangements for materials, services, equipment, etc., and will have the right to cancel any of the 2400 supplier contracts now in effect. Furthermore, Chrysler is to assign as soon as possible key personnel necessary for the operation.

Wilson Says GM Can Manage Under Quotas

While Ford Motor Co. and many other automobile companies have been battling before NPA over production quotas, General Motors Corp. has remained on the sidelines for the most part.

However, the company's position has been made clear by C. E. Wilson, GM president. He told stockholders at the annual meeting in May that present NPA schedules on automobiles are "livable ones" and probably will not result in any shortage of cars.

He added, though, that the Government should have eased controls on production and materials before removing credit restrictions. More money was thereby released to compete for the limited automobile output.

Mr. Wilson went on to say that despite a decline of approximately 15 per cent in GM's civilian production this year, military production has increased. Thus, the company's volume will be about equal to that of 1952.

Stockholders at the meeting approved continuation of the GM bonus plan, defeating a proposal by one stockholder to limit the annual amount of compensation paid to officers of the corporation. Under the company's by-laws, the bonus plan must be submitted to shareholders for renewal at least once every five years.

NASH DUAL-PURPOSE GREENBRIAR

The new 1952 Rambler Greenbriar is offered by Nash Motors Div. of Nash-Kelvinator Corp. as a combined station wagon-sedan. Maximum cargo space is said to be obtained by dropping the tailgate to extend floor length to six ft, 5 in. The Greenbriar is powered by an 82-hp, six-cyl, L-head engine with a compression ratio of 7.25 to 1.

Thompson Signs Contract for Jet Parts Facility

A general contract, valued at approximately $1.25 million, for the construction of a plant for the manufacture of jet aircraft engine parts has been signed by Thompson Products, Ltd. The plant will cost $3 million when completed and equipped.

Goodrich Develops Tire for Higher Car Speeds

One result of the continuing horsepower race in the automobile industry has been the pressure on tire companies to come up with a passenger car tire to meet safety requirements of much higher sustained highway speeds. B. F. Goodrich Co. currently has under test a new tire reportedly designed to perform safely at sustained speeds of more than 100 mph.

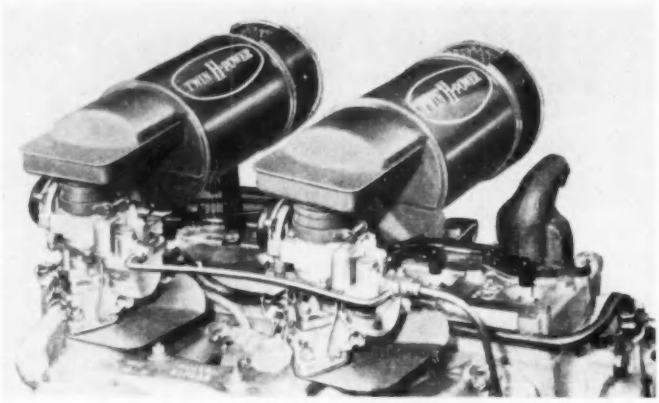
Much of the test work is being done on a special machine which simulates a road surface and provides speeds up to 135 mph. Some road testing is being done, however, on a controlled length of highway in the Southwest. The new type tires are said to be similar in design to the current low-pressure, cushion-type tires now in use on passenger cars. In order to overcome tread separation failures resulting from heat built up by high speeds, it is claimed that adhesion has been increased between tread and carcass, while special reinforcement has been developed to reduce flexing.

Chevrolet Aviation Plant to Start Engine Output

Chevrolet's Aviation Div. plant is expected to turn out its first 2700-hp R-3350-26W piston aircraft engine in July or August. Manufacturing operations already have started for nearly all of the assembly parts.

Meanwhile, work on the $30 million expansion of facilities in Tonawanda, N. Y., for the aircraft engine program is said to be progressing rapidly. Steelwork for a 230,000 sq ft forge near the Tonawanda Div. plant is more reported than half up.

News of the AUTOMOTIVE



NEW HUDSON CARBURETION SYSTEM

A new Twin H-Power advanced carburetion system, recently introduced by Hudson Motor Car Co., is said to increase engine efficiency by an equalized and uniform distribution of gasoline to all cylinders. Increased power output on regular fuel is reported. It is optional equipment on the Hornet, Wasp, and Commodore Six

Chrysler Will Build Bodies in Calif.

Chrysler Corp. is getting ready to institute its first passenger car body assembly operation on the West Coast. The body-building operation will be started soon at the Dodge San Leandro, Calif., plant, where a dual civilian and defense operation is being carried on.

Bodies will supply assembly lines at the San Leandro plant and the Chrysler plant in Los Angeles, Calif. Components for the bodies will be shipped from Detroit, Mich., and the operation will include fabrication, paint, and complete trim.

Reo Awarded Contract for Rescue Trucks

Reo Motors, Inc., has been awarded an initial order for 55 specially equipped civilian defense rescue service trucks.

Engine used in the unit will be the 140-hp power plant currently installed in the military 6x6 truck Reo is building. The rescue truck has a GVW of 20,000 lb.

Equipment to be furnished by the Government, and installed by Reo, includes 99 separate items of tools and equipment ranging from small hand tools to power generators and saws. Production will start in the third quarter of this year at the rate of about ten units a day.

Three Mich. Cities Dropped from Critical Labor List

Detroit, Flint, and Grand Rapids, Mich., have been dropped from the Government's list of critical labor areas. Unemployment in these areas is said to be below six per cent, with the drop in Detroit quite spectacular. The motor city's unemployment fell from 120,000 as of Jan 1 to less than 70,000 in April.

At the same time, mobilization officials removed the three cities from its list of 37 areas which are to get preferential treatment in the awarding of defense contracts.

Army Now Reactivating Tenn. Ordnance Works

Reactivation of the Volunteer Ordnance Works at Chattanooga, Tenn., was recently announced by the Dept. of the Army. Negotiations are being conducted by the Army Ordnance Corps to select a contractor to operate the plant. The facility will be used for the manufacture of TNT.

Supreme Court Upholds Management Privileges

A U. S. Supreme Court decision, which has considerable significance for the automobile industry, holds that employers are not required to bargain with unions on management prerogatives dealing with employment and production.

The Court held that a Texas insurance company was not required to bargain on such matters as promotions, discipline, and work scheduling, as had been proposed, by a local union. The high court's ruling upset a National Labor Relations Board charge of refusal to bargain under the Taft-Hartley law and a Court of Appeals decision upholding NLRB.

Caterpillar Finds Red Tractors Good Copies

Caterpillar Tractor Co., after a study of two captured Russian tractors, has stated that the machines are copies of Caterpillar's D-7 tractor. Its engineers say that the machine, the Stalinetz 80, is a well-engineered, well-manufactured copy reflecting Russian practices, machine tools, and raw materials available.

The Russians apparently redesigned the machine to fit more convenient metric dimensions. Other conclusions were that parts are sound, anti-friction bearings very good, and metallurgy excellent.

Although the company did not operate the complete tractor, general opinion was that it would be noisier and have a slightly shorter life than the Caterpillar machine from which it was copied. On the whole, however, Caterpillar feels that the tractor would give satisfactory operation.

Army Buys Detrola Plant in Detroit

The Dept. of the Army has purchased the former Detrola Plant in Detroit, Mich., from the Newport Steel Corp. for $1,173,700.

The plant previously had been leased to provide office space for the Ordnance Tank-Automotive Center. It is understood that the entire plant will be used by the Ordnance Corps, but specific details are not known.

AND AVIATION INDUSTRIES

New Small Hudson Car Will Weigh 2800 Lb

Hudson Motor Car Co. has revealed a few scant details about the new light car it will introduce shortly. The vehicle will weigh about 2800 lb, accommodate six passengers, and have an engine with more than 100 hp.

Its weight classification will fall between the "Big Three" volume lines and the light cars produced by Nash, Kaiser-Frazer, and Willys. Its horsepower, however, will be in the Ford-Chevrolet-Plymouth class, and the horsepower to weight ratio reportedly will be highest in the low-priced field.

The company expects to do a considerable volume of export business with the car, since it puts Hudson in a size and price field which meets the limitations imposed by some export markets. The company is said to be unable to invade these with its present line.

Noteworthy Points Made at Recent AISI Meeting

In the course of a talk made before the recent general meeting of the American Iron and Steel Institute, Frank H. Fanning, vice president in charge of operations, Armco Steel Corp., made one rather interesting observation.

He pointed out that, along with the improved properties of sheet steel in the past two or three decades, the price of cold rolled automobile sheets has been reduced from $135 a ton to $104. This was accomplished in spite of appreciable increases in steel wages and prices of commodities made principally from steel.

Another speaker, Jerome Strauss, vice president, Vanadium Corp. of America, pointed out that solid glass, which becomes liquid and acts as a lubricant at high temperatures, is the key factor in the Ugine-Sejournet process of hot extruding steel now being employed by some steel producers and fabricators in the U. S.

He went on to say that glass or glass-like material was found to be the only product which acted as a good lubricant for hot steel being thrust through a die, while simultaneously protecting tools from contact with the steel and insulating them from excessive heat. The steel "seized" in the die to ruin both die and the steel with other lubricants tried. He said that originally plant glass was used, but recent experiments have proved that woven or fibrous glass is just as effective and easier to handle.

A. O. Smith to Make Steel Bomb Casings

A. O. Smith Corp. has been awarded a contract by Army Ordnance for production of steel bomb casings. Amount of the order is more than $5.1 million.

The company will make the bomb body, nose, and fins for the tail. The explosive will be loaded elsewhere.

Kropp Earnings Reach a New Record High

Kropp Forge Company has reported that for the nine months ended April 30, 1952, consolidated net sales were $21,905,316, and net income was $599,191. Both sales and income reached an all-time high.

Russians Offer DKW Car to Western Customers

Considerable attention is said to have been attracted by a new type of small car which the Russians have recently offered in several European and Latin American markets. This IFA-DKW F 9 automobile reportedly has been produced for the last few months by the DKW factory at Zwickau in East Germany.

The car is powered by a three-cyl, two-stroke engine with a 6.25 to 1 compression ratio and develops 28 hp at 3600 rpm. Prices for sedan and convertible models are said to run approximately $800 and $980, respectively, f.o.b. Hamburg, Germany.

More of Indiana Ordnance Works is Reactivated

Reconditioning and reactivation of the remaining three production lines at Indiana Ordnance Works, part of the Indiana Arsenal at Charlestown, Ind., were announced recently by the Dept. of the Army.

A "cost-plus-a-fixed-fee" contract of over $60 million covering both the reconditioning and operation of three smokeless powder lines will be negotiated with du Pont Co.

TICKLISH RESURFACING JOB

A finishing machine distributes bituminous concrete on a banked turn of the high-speed track at the General Motors Corp. Proving Ground, Milford, Mich. This turn, which has a maximum slope of 77 per cent, is only one of many on the five-lane, 3.8-mile track that were recently resurfaced. The finishing machine and a roller were operated at an extreme tilt by cables attached to a specially equipped tractor.

News of the AUTOMOTIVE

STREAMLINED JEEP

A streamlined version of the Army Jeep is now rolling off the assembly lines at Willys-Overland Motors, Inc. The rounded hood is higher, while the body is slightly longer and wider. The new model is now powered by a more powerful 72-hp F-head engine.

Institute Slated to Aid Business on AEC Orders

The University of Michigan Law School will hold an Institute at Ann Arbor, Mich., June 26 to 28, to enable businessmen to discuss possible contracts and licensing arrangements with the Atomic Energy Commission.

AEC representatives will explain procedures for obtaining isotopes for industrial uses, Government patents available for licensing, and contract policies. There will also be a discussion of industrial and legal problems of private industries which may be interested in participating in the development of atomic energy.

Second Auto Company Rumored Involved in K-F Merger Deal

It has been reported that a second automobile company might be involved in the merger presently under study by Kaiser-Frazer Corp., Consolidated Vultee Aircraft Corp., and Atlas Corp. Basis for the report is that with increased aircraft activity at Willow Run, Mich., which would result from moving Convair production there, outside space would be required for automobile production.

Hudson Motor Car Co. was named in one report as a possible party to the merger. It has been categorically denied, however, that such a proposition is under consideration.

Merchant Named ASLE President

The following new officers were elected at the recent annual meeting of the American Society of Lubrication Engineers:

President, M. E. Merchant, senior research physicist, Cincinnati Milling Machine Co.; vice president at large, W. E. Campbell, in charge of research and development in lubrication and organic analysis, Bell Telephone Laboratories; secretary-treasurer, W. H. Fowler, Jr., chief industrial lubrication engineer, Pure Oil Co.; administrative secretary, W. P. Youngclaus, Jr., former regional manager, Industrial Div. of Alemite Div., Stewart-Warner Corp.

Binks Launches Expansion Plan

Ground was recently broken for a $600,000 sheet metal shop for Binks Manufacturing Co. The building will be the first unit in a new development that will provide 223,000 sq ft.

Ryan Receives Order for Missile Motors

A contract for production of missile motor components of a type recently developed by Aerojet Engineering Corp. has been awarded by Aerojet to Ryan Aeronautical Co.

1952 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

	May 1952	April 1952	May 1951	Five Months 1952	Five Months 1951
Chrysler	11,734	11,685	19,014	55,342	76,416
DeSoto	6,876	6,438	14,557	41,640	52,136
Dodge	22,441	24,726	32,075	108,756	151,520
Plymouth	43,458	46,008	69,650	201,045	311,123
Total—Chrysler Group	86,509	90,857	135,296	406,786	591,195
Ford	68,756	71,060	83,149	294,560	445,852
Lincoln	3,455	2,322	2,492	12,611	13,059
Mercury	15,699	16,883	22,287	70,716	115,778
Total—Ford Group	87,910	90,265	107,928	377,907	574,689
Buick	29,940	32,175	37,567	139,051	194,624
Cadillac	8,839	9,002	8,987	38,219	47,280
Chevrolet	81,696	88,263	103,482	380,158	537,080
Oldsmobile	21,101	22,771	26,401	98,131	136,982
Pontiac	25,256	27,238	31,980	117,191	165,100
Total—G. M. Group	166,832	179,449	208,437	772,751	1,081,066
Kaiser-Frazer Group	5,620	5,675	5,372	26,114	66,281
Hudson	5,460	6,984	5,269	35,005	72,031
Nash	16,821	15,493	17,077	55,657	76,111
Packard	5,985	6,263	6,879	27,692	39,557
Studebaker	13,830	14,688	19,922	76,060	110,929
Willys	4,805	5,056	2,389	24,287	15,451
Total—All Makes	393,772	414,732	508,569	1,802,259	2,627,310

AND AVIATION INDUSTRIES

Auto Output Seen Rising in a Competitive Market

Even though there appears to be little possibility that the automobile industry will be completely decontrolled, prospects are bright that production the rest of this year will be adequate to meet demand. The only thing that seemingly could be a serious obstacle would be a long steel strike.

Third Quarter Up

The present quarter probably will be the largest of the year, since production of nearly 1.23 million passenger cars is expected. Although NPA quotas for this quarter total only 1,050,000 units, this can be exceeded by borrowing on the following quarter's quota up to 15 days of production.

During the fourth quarter there will be some shut-downs for model changeovers, and some possible downward readjustments of schedules as seasonal demand tapers off. In general, it is believed in the industry that, while unit limitations will be retained, NPA will endeavor to be liberal with materials so that curtailed schedules will not be necessary.

Metals Questions

Most basic materials are expected to be in good supply, although a few still are short and show little signs of improvement. One of these is nickel, and there is even some talk that its use in bumpers and bumper guards may be curtailed or prohibited, although nothing definite in that direction is indicated at this writing. It is thought, however, that there will be enough nickel for strictly functional parts.

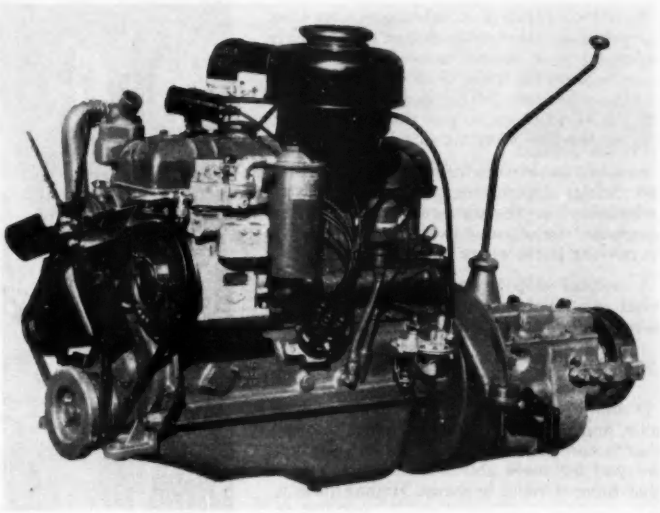
One slight complication in the copper picture is the confusion resulting from the two-price system for domestic and foreign copper. Both the copper industry and automobile manufacturers reportedly would like to see all ceilings on copper removed to simplify calculations and to eliminate red tape.

Sales Increase Noted

Current new car demand is said to be fairly brisk on the whole and is expected to continue so for the next two or three months at least. Easing of credit curbs undoubtedly helped somewhat, although most of the improvement is credited to the normal seasonal upturn.

However, the present market is not anywhere near as strong as it was during the immediate post-war years, or in the period following the outbreak of the Korean war. The industry, therefore, is looking for a genuinely competitive market for the balance of this year. Sales staffs are being reorganized and strengthened, and work on new models is rapid.

(*Turn to page* 154, *please*)



DIAMOND T TRUCK ENGINE

Power plant for the Diamond T Motor Car Co.'s new Model 622 truck is this Continental K6330 overhead-valve engine. Its output of 141 hp at 3000 rpm is said to permit cruising speeds of over 55 mph with maximum loads on a single-axle trailer. Compression ratio is approximately 6.5 to 1, displacement 330 cu ft in., and maximum torque 266 lb ft. Notable features are sodium valves and a duplex carburetion system.

1952 MOTOR VEHICLE FACTORY SALES*

	Passenger Cars	Trucks	Buses	Totals 1952	Totals 1951
January	273,572	101,060	778	375,410	606,933
February	333,985	100,706	625	435,216	618,321
March	373,231	109,173	569	482,973	756,022
April	416,155	112,833	597	529,585	639,272
Total—Four Months	1,396,943	423,772	2,569	1,823,184	2,619,448

1952 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	35,127	17,632	5,914	22,409	6,368	9,176	4,234	101,060
February	34,455	18,114	6,251	23,278	5,149	9,132	4,327	100,706
March	38,721	19,482	5,857	24,347	5,692	10,076	5,028	109,173
April	43,393	22,313	5,670	21,959	4,980	10,041	4,797	112,833
Total—3 Mos. 1952	151,696	77,711	23,692	91,993	21,899	38,425	18,386	423,772
Total—3 Mos. 1951	221,201	95,455	38,427	92,363	24,981	25,595	14,005	511,727

* Automobile Manufacturers Association.

Why it takes two sales to complete one!

COMPLETING a car sale takes more than just a signature on the dotted line. Equally important is a second sale—*keeping* a customer sold on the make of car he has bought. And this other sales job increases in importance when motorists have to give their cars longer, tougher service before turning them in.

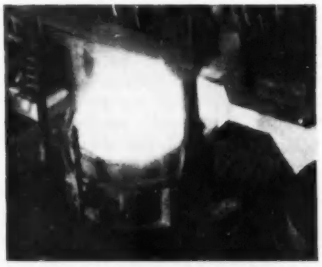
Satisfied car-buyers want the built-in value that brings dependable performance, extra "saleability" on the used-car lot. And this is especially true of value in the "vital zone"—the moving parts where value counts *most*.

A helpful step toward giving customers "vital zone" value is to keep this simple formula in mind when buying component parts:

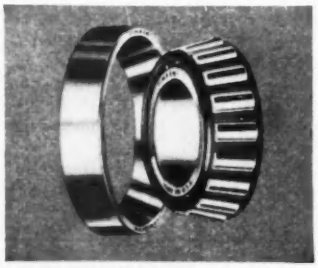
$$Value = \frac{quality + service + public\ acceptance}{price}$$

It shows that price is only one factor in value, and must be weighed in relation to the other factors *above* the line. Timken® bearings give you far more above the line than any other tapered roller bearings. Higher quality, better service, and more public acceptance. And in terms of value features, Timken bearing prices are lower today than ever. The Timken Roller Bearing Company, Canton 6, Ohio.

How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



WE MAKE OUR OWN STEEL—because it's the only way we can get consistently high quality steel for Timken bearings. And because it gives us quality control from start to finish. The Timken Company is the only automotive bearing manufacturer in America that makes its own steel.



PINION-PROVED! All but two makes of cars use Timken tapered roller bearings on the pinion—toughest bearing application in a car. And they're also giving top value at other "vital zone" points . . . in differentials and transmissions, steering gears and wheels.

ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓡ AND THRUST →ⓣ← LOADS OR ANY COMBINATION →✳←

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Magnaflux Corp. — Hamilton Migel has been made second vice president in charge of engineering.

Magnaflux Corp.—**Roy O. Schiebel, Jr.**, and **Kermit A. Skeie** have been made eastern manager and midwest manager, respectively.

Holley Carburetor Co.—**M. J. Kittler** was recently elected executive vice president, while **C. H. Hofmeister** is now vice chairman of finance and treasurer. **Harry T. O'Connor** was named assistant to the chairman of the executive committee.

Chrysler Corp., Export Div.—**Philip K. Hills** has been appointed vice president and general sales manager. He was also made vice president and a director of Chrysler Export Corp.

Willard Storage Battery Co.—**Paul Meaden** was recently chosen advertising service manager.

U. S. Rubber Co.—**Arthur M. York** is now assistant director of public relations.

Republic Aviation Corp.—**Lowery L. Brabham** is now sales manager.

Consolidated Machine Tool Corp.—**Lester D. Chirgwin** has been elected president.

P. R. Mallory & Co., Inc.—**Frank B. Powers** is now vice president in charge of manufacturing.

Orion, Inc.—George D. Sherman has been named president.

General Motors Corp., Chevrolet Motor Div.—**H. F. Barr** has been appointed assistant chief engineer in charge of engine and passenger car chassis engineering. **E. G. Sprung** is now assistant chief engineer in charge of truck chassis engineering, while **Maurice Olley** has been named to the new post of director of research and development, assisted by **M. S. Rosenberger.**

Thermoid Co.—**Lester F. Cox** has been elected executive vice president and executive manager.

Vickers, Inc.—**Harry F. Vickers** was recently elected president of the parent Sperry Corp., while **Kenneth R. Herman** was chosen vice president.

Wagner Electric Corp. — George W. Brown was recently chosen executive engineer.

Chrysler Corp., Plymouth Div.—**Frank L. DeCavitte** has been appointed operating manager, and **Roy W. Vorhees** succeeds him as Detroit factory manager.

General Motors Corp.—**Oscar A. Lundin** was recently appointed general auditor.

Fruehauf Trailer Co., Tank-Trailer Div.—**K. A. Krieger** is now sales manager.

C. E. Niehoff Co.—**Fred H. Geyer** has been elected to the board.

International Harvester Co., Motor Truck Div. — R. C. Burns is now general supervisor of used truck merchandising.

General Motors Corp., AC Spark Plug Div.—Karl K. McGarvey was recently appointed sales manager of equipment sales.

Vascoloy-Ramet Corp.—**Herbert B. Clark** was recently elected president, while **Harry W. Highriter** was made vice president.

(*Turn to page* 112, *please*)

Necrology

John L. Perry, 71, former president of Carnegie-Illinois Steel Corp. and advisor to U. S. Steel Corp., died May 27, in Pittsburgh, Pa.

Walter Evans, 53, a vice president of Westinghouse Electric Corp., died May 28, in Baltimore Md.

William L. Clark, 73, vice president of J. I. Case Co., died May 16, in Racine, Wis.

John W. Lambert, 92, automobile pioneer and builder of the old Lambert car, died May 20, in Anderson, Ind.

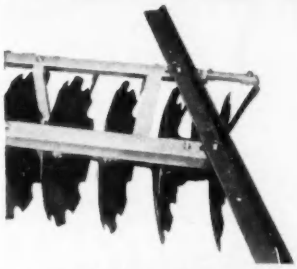
Walter G. Blume, 53, director of stainless steel sales for Superior Steel Corp., died May 18, in Sturgeon Bay, Wis.

Emanuel J. Freitas, 76, former president of American Body Co., died May 18, in Buffalo, N. Y.

Earl C. Williamson, president of Fram Florida, Inc., and director and vice president in charge of manufacturing for Fram Corp., died May 29, in Jacksonville, Fla.

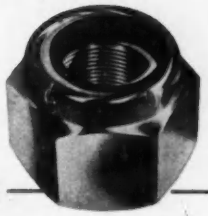
Francis H. Marling, 59, advertising manager of Pure Oil Co., died May 18, in Glencoe, Ill.

VERSATILE NEW RODERICK LEAN MOBIL-DISC HARROW



Unusually flexible, rigid frames are fastened securely with Elastic Stop Nuts

Equipped throughout with vibration-proof, self-locking Elastic Stop nuts



A new, and completely re-designed wheel type disc harrow—the revolutionary Mobil-Disc, manufactured by Farm Tools, Inc., Mansfield, Ohio—owes many of its fundamental advantages to the positive, shock-proof locking of Elastic Stop Nuts.

Mobil-Disc frames are flexible enough to perform over the roughest contours, yet tough enough to insure uniform soil penetration. It is called the most shock-absorbent frame ever built—the result of a new design approach which eliminated the older welded construction. Field studies of welded joint construction revealed that fatigue frequently resulted in joint fractures; in other cases frames were permanently "set" or bent by service operating conditions. The new method of construction specifies alloy steel section members, bolted together for greater frame elasticity and strength. Grueling field tests proved that Elastic Stop Nuts provided the only bolting method that would withstand the work-load Mobil-Disc was engineered to take!

The 200-odd Elastic Stop Nuts on each Mobil-Disc perform a double function that no other type of fastener can duplicate. They must *stay on*, under the most extreme punishment. In addition, for the Mobil-Disc to perform properly, they must *hold together* the various functioning parts without any "give". This is basic in the design of the new machine—the flexible recovery of the frame depends upon complete tightness between bolted sections—and thorough tests have proven Elastic Stop Nuts' dependability.

POINTERS on how to get best results from Elastic Stop Nuts, with an explanation of how the famous Red Collar works, are yours for the asking. Just mail our coupon.

Elastic Stop Nut Corporation of America is also maker of the ROLLPIN

ROLLPIN TRADEMARK

Dept. N16-65, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send the following free information:

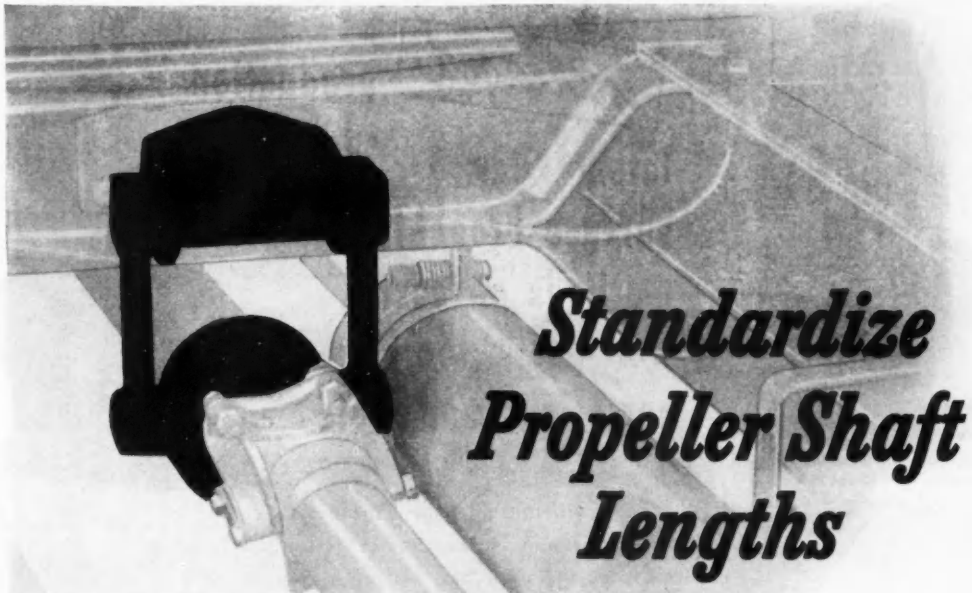
- ☐ Hints on use of Elastic Stop Nuts
- ☐ AN-ESNA Conversion Chart
- ☐ Elastic Stop Nut Bulletin
- ☐ Rollpin Bulletin

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____



Standardize Propeller Shaft Lengths

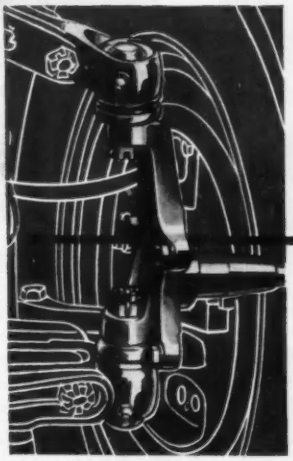
WITH Thompson CENTER BEARING HANGER ASSEMBLY

THE NEW Thompson Center Bearing Hanger makes possible, for the first time in truck building history, standardization of propeller shaft inventories. Fewer lengths can now be stocked and used, making assembly and service easier . . . drive more direct.

The Thompson Assembly is completely symmetrical. Its flexibility eliminates the need for precise positioning by shims. Two simple snap rings retain the bearing, making adjustments unnecessary.

Free swinging arms and rubber bushings eliminate cramping of the bearing due to frame twist and drive-line movement. A combination of shaft seals and slingers provide ideal bearing operating conditions. And four, widely spread rubber bushings—acting in tandem—reduce high frequency vibration . . . help to insulate cab from drive line and frame noise.

Investigate this new Thompson truck development. Let us show you how it will cut production and distribution cost, improve "in-service" operation. Write to Thompson Products, Inc., 7881 Conant Avenue, Detroit, Michigan—or telephone WA 1-5010.

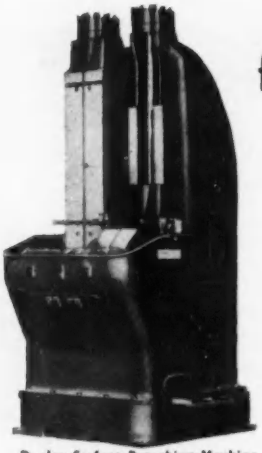


BALL JOINT SUSPENSION—another Thompson Development for automotive improvement.

Thompson Products, Inc.

DETROIT DIVISION

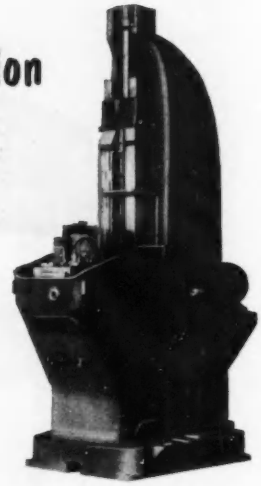
7881 Conant Avenue • Detroit, Michigan



Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

for *increased* production

latest surface broaching methods on cast iron parts, teeth serrations and slots



Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

Whether the material is steel or cast iron, parts are being successfully surface broached on Footburt machines. Broaches used on Footburt Surface Broaching Machines have a patented tooth that is especially advantageous on heavy cuts. We will be glad to work with you on your machining problems and make recommendations based on our many years experience in surface broaching.

THE FOOTE-BURT COMPANY, Cleveland 8, Ohio • **Detroit Office: General Motors Building**

Continuous Type Broaching Machine. Made in 4 Sizes.

FOOTBURT

surface broaching for difficult machine work

SEALED TO ORDER BY VICTOR

CRANKSHAFT SEALING AT ITS BEST — WITH VICTOR

Pioneered and patented by Victor, this 2-piece Split Seal design, by actual test, outperforms all other sealing methods—with greatest economy. It simplifies installation; eliminates tapping and bolting operations. Made to last for normal engine life, yet can be replaced on the engine quickly and economically.

Why NASH Engineers Prefer this Improved Rear Bearing Sealing Method

Nash engineers weren't satisfied with old standards for sealing the rear crankshaft bearing. They wanted sealing performance abreast of modern engine requirements. They wanted extra dependability . . . economy . . . simplified installation . . . longer service life. And they found it in *Victor 2-piece Split Seal Design*—the outstanding development for positive oil retention at this vital engine point.

Sealed by VICTOR means satisfaction

The Split Seal Principle is but one of Victor's continuing achievements in automotive sealing since 1909. For all such applications, Victor offers the pioneer's skill and the leading facilities for designing and producing oil seals to your specifications—*and complete satisfaction!*

Where can we help you to better sealing?

Victor Manufacturing & Gasket Co., *and its affiliate,* Victor Sealing Products Co., Inc., P. O. Box 1333, Chicago 90, Ill.

VICTOR

"ORIGINAL EQUIPMENT"

Gaskets and Oil Seals

SEALING PRODUCTS EXCLUSIVELY

Strangling

The Free Competitive

ANY and all controls breed power and are incompatible with freedom. They become power in themselves, and their administration creates the need for more and more officials. Thus, controls and bureaucracy feed upon each other. The Hoover Committee found that out of 59 major departments and agencies throughout the Federal Government, no less than 46 were involved in foreign affairs in one way or another.

Whenever two government departments start taking an interest in the same subject, they have to set up what Government language calls "coordination," through an interdepartmental committee. The Hoover Commission found there were at least 30 such committees, with about 140 sub-committees, at different levels, dealing with foreign affairs alone. That was four years ago. It is a safe guess that there are more now.

Today there are 1470 people employed in the Executive Office of the President. At the turn of the century, during the administration of Theodore Roosevelt, there were only 20 such people. Even Franklin D. Roosevelt, at the height of his responsibilities in World War II, had less than 600 people in his Executive Office.

Mushrooming of Personnel

In 1929, the Federal Government had 596,000 civilian employees. Before World War II this figure had a peacetime growth to about one million—more than even at the peak of the first World War. During the second war, the total rose to more than three and a half million.

It did drop to two million in the postwar period, but last year it had risen again to 2,450,000. Add to this about four million civilian employees of state and local government and you have a grand total of somewhere between six-and-a-half and seven million civilian government officials in the United States today—one controller for every nine producers in the whole country.

More alarming still, for those who are not afraid to see the signs, is the extent to which government power is being centralized. In 1929, the Federal Government had less than a quarter as many civilian employees as the state and local governments had. In 1949 that proportion had increased to well over half as many, and it's still going up.

Expansion of Powers

Our Government today is taking an increasing role in determining what shall be produced, how it

"IN the conception of their functions, in their personalities, in their motives and in the ends they pursue, the men who seek to plan the American economy no more resemble the British Socialists than the latter resemble the men of the Politburo.

"The real point is that all these men, in their different ways, have accepted the concept that a centralized Government power is the guiding motive for the nation. When we say that the Soviet system has failed or that British Socialism has come near to destroying the economy of Britain, what we mean is that planning has failed. It is impossible for controls and the free, independent spirit of humanity to exist together in the same national community."—E. R. B.

System

shall be produced, who shall produce it, what price can be charged, and how much will be paid those who produce—either as owners or workers. It has even undertaken to produce goods or services in areas that are or could be covered by private enterprise.

The difference between Government control of production and distribution facilities and Government ownership of these same facilities is not very great. So far as the individual and private property are concerned, it makes very little difference. Allocations, price fixing, priorities, wage regulations, and a profit-grabbing tax-take on corporations that now goes as high as 82 per cent are all limitations on the uses to which private property can be put.

By
Ernest R. Breech
Executive Vice President
FORD MOTOR CO.

The essence of the free market economy is that you can do what you want with your own within reasonable limits; the essence of the controlled economy is that you cannot. What Government control does is to change the content and meaning of "ownership." If controls are sufficiently extensive, the Government might as well own the property as far as the individual's liberty to use it in his own way is concerned.

Needlessness of Controls

Do we any longer need price and wage controls or a controlled materials plan? What are the dangers in maintaining these controls beyond a point where they are truly effective?

Within about two months after the price freeze of January, 1951, wholesale prices began to decline and retail prices began to level out. OPS and Economic Stabilization officials repeatedly claimed that this was due to their price controls. And yet, by the fall of 1951, most prices were actually below ceiling. Obviously, forces other than price controls were responsible for the price declines and the stability.

Just how necessary price controls are can be seen from a news dispatch from the *Washington Star* on November 15, 1951, which stated: "The OPS today rolled back ceiling prices of used automobiles 6 per cent below levels of last January in an order that fixes new ceilings at about current market levels." Now, what I want to know is why we, as taxpayers, should finance public officials who are so unessential that they must spend their time fixing ceiling prices "at about current market levels."

Isn't it about time somebody in Washington realized that inflation was checked in the spring of 1951, more than a year ago, and has stayed checked ever since? This was accomplished primarily through tax increases, credit controls, increased savings, the inability to spend Government appropriations on schedule and—by no means the least important—the self-discipline of the consumer who always cuts down his purchases when prices get too high.

In spite of repeated Government predictions, shortages of consumer goods have failed to materialize. Thus, one of the main reasons given for price and wage controls does not exist. In fact, many items—durable goods as well as soft goods—are in over-supply.

In this country we have some four million separate business establishments producing more than eight million different items. Even in a single company, there may be as many as 200,000 different products. And in just one product like an automobile, for example, there may be as many as 15,000 different parts. Many of these products and parts undergo constant change, improvement, and adaptation.

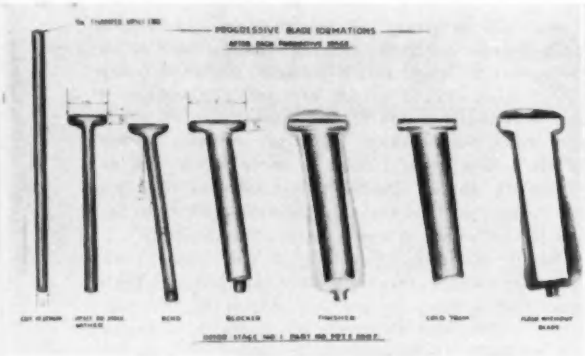
No price control system can possibly allow currently for such factors as these. Anything so complicated, under such constant change and so responsible to human and business needs, is not subject to even a simple control mechanism. All experience shows that simple controls become steadily more complicated because a highly technological society cannot be confined to strait-jacket rule-making and control and remain dynamic and progressive.

Dangers of Controls

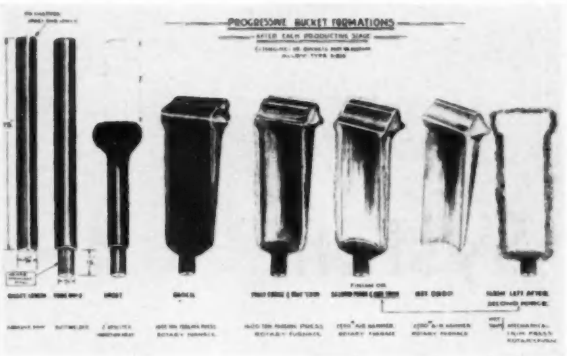
Controls over a nation's economy do not come cheap. They bring with them direct and indirect costs that must be paid by all of us as taxpayers and consumers. All of these added costs are an added charge on the actual and potential output of the economy.

Business and industry are forced to take on a heavy load of additional work and costs in order to comply with the many regulations dealing with price

(*Turn to page* 80, *please*)



Typical of the operations required to produce blades and vanes at Packard is this drawing showing progressive blade formation.

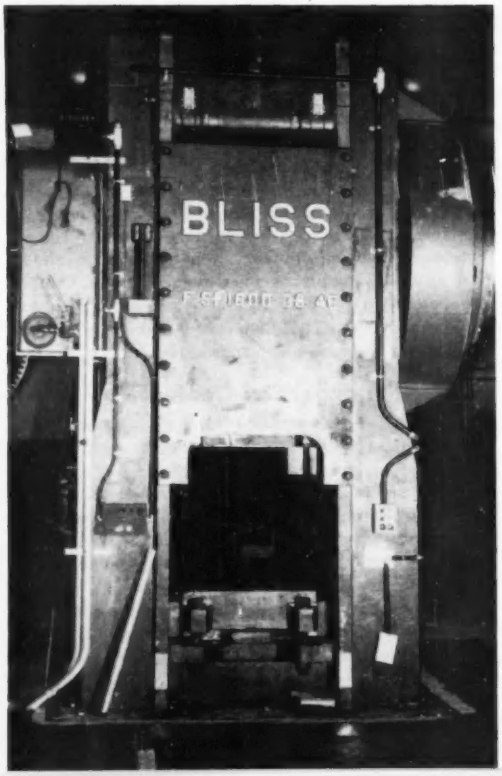


Progressive stages in the making of turbine buckets are shown in this layout.

By Joseph Geschelin

Precision Forging Turbine Vanes, Blades,

One of the new 1600-ton Bliss presses to be used for finish-forging buckets is shown in the process of installation.



PRECISION forging of turbine vanes, blades, and buckets by advanced methods now under production development marks the basis for the facilities being installed by Packard Motor Car Co., in its Mt. Elliott Plant. According to the management, it is significant that this is the first mass production setup of its kind established by an automobile manufacturer.

While awaiting the arrival of the many items of equipment required to complete the layout, Packard is producing these parts by conventional methods—in the main—and necessarily in smaller volume. Nevertheless, production has been established on a limited scale and will continue without interruption during the ensuing period of machinery installation and tooling.

It is the purpose of this article to provide a brief high-lighting of the operation, touching on the conventional methods being employed. Another study is contemplated later this year when the forging plant will be on a mass production basis.

Although a number of different blades and vanes are used for each machine, each one requiring a different set of dies and tools, the basic production technique remains the same. The stainless steel alloy used for blades and vanes is considered to be readily workable and does not pose the prob-

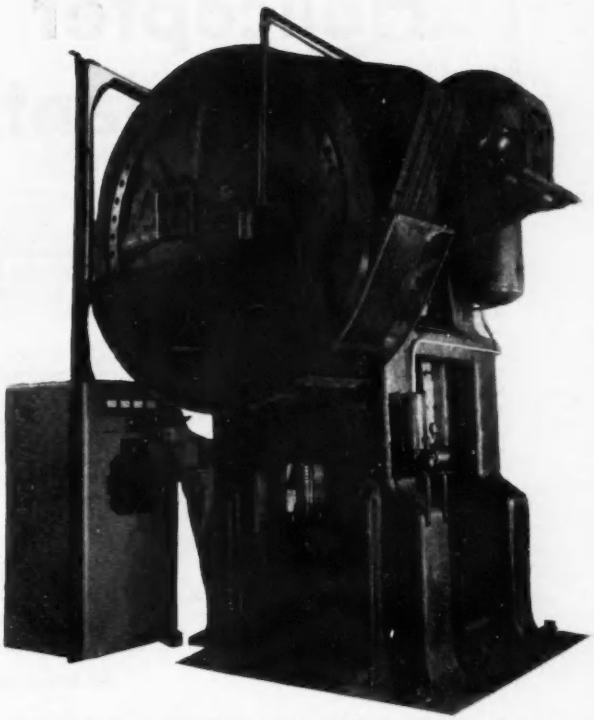
lems found in the making of buckets from high temperature resistant alloys. Nevertheless, the specifications for quality and fine surface finish demand complete freedom from scale in all stages of forging, and consequently involve special cleaning operations between formations.

In addition, induction heating as well as the alternate method of Holcroft electric furnace heating with controlled atmosphere are essential to prevent formation of scale in the forging process.

Generally speaking, blade and vane fabrication involves five basic stages. The resulting product is true to size and contour and with excellent surface finish without further machining or grinding.

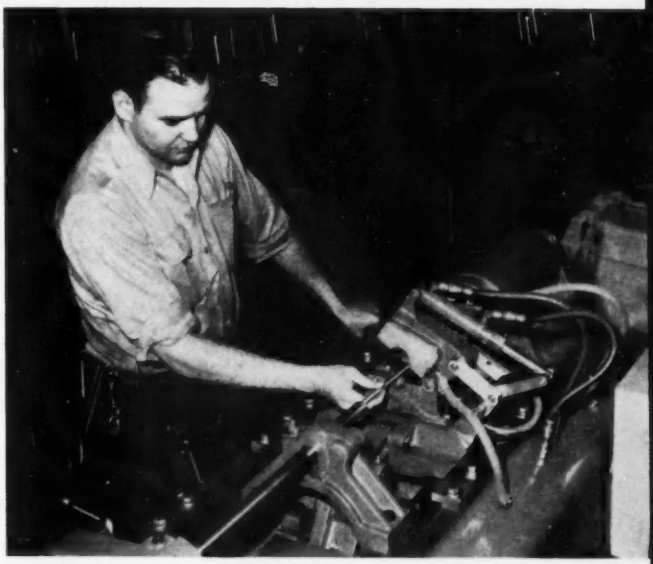
The five basic steps may be briefly summarized as follows, immediately below:

of
and Buckets



Step four in producing blade forgings is handled in a number of different press setups, the one shown here being a 1300-ton Maxipres. Billets are heated in the special Tocco induction heating unit seen at the left.

Close-up of work station of the Massey-Harris electro-forge stock gathering machine which provides the second stage in the making of blades and vanes. The operator is seen in the act of placing the billet in the fixture. The hydraulic ram is the bar to the left; the inductor is at the extreme right.



(1) Centerless-ground bar stock, received in random lengths, is washed and rinsed, cut to billet size. Centerless grinding is specified to assure the desired surface finish.

(2) The billet then is upset to develop the gathered end, using a Massey Harris Electro-Forge stock gathering machine and a 125 ton Bliss press for restrike after stock-gathering.

(3) Next is the stud-welding of the tong-hold onto the billet. The tong-hold is of selected carbon steel, the extra operation being amply justified by the saving in expensive and critical alloy.

(4) The billet goes to a Wheelabrating machine for cleaning and then to 1300 ton forging presses of various makes, including Bliss, Ajax, and Maxipres for blocking. Billet heating for this operation is handled by induction heating, as illustrated in connection with the National Maxipres. Induction heating equipment is supplied by Tocco.

(5) Finish-forge and cold trim: The blocked forging is cleaned in an Amer-

(*Turn to page* 87, *please*)

Helicopter Powerplant Analysis

BECAUSE of the fast growth of the helicopter industry during the past year, the Eighth Annual Forum of the American Helicopter Society, held in Washington, D. C., last month was one of the most important in the society's history. In addition to 15 technical papers and a two-day air show at Bolling Air Force Base, the forum included the installation of new officers, the presentation of three annual awards and an address by Secretary of the Army Frank Pace, Jr.

Thomas R. Pierpoint, service manager, Piasecki Helicopter Corp., was installed as the new president of the AHS. Six regional vice-presidents were also elected. They are Miller Wachs, Sikorsky Aircraft, New England; Charles W. Lefever, Prewitt Aircraft Co., Middle Atlantic; Ray Young, Navy Bureau of Aeronautics, Southeastern; Charles R. Wood, McDonnell Aircraft Corp., Midwest; John Beadling, Bell Aircraft Corp., Southwest; and Robert Wagner of McCulloch Motors, West Coast.

Presented herewith are portions of three of the many interesting papers concerning recent helicopter development and research which were read at the well attended conference.

Gas Turbines Versus Reciprocating Engines

By Joseph Stuart III

Bell Aircraft Corp.

THIS analysis has been prepared to show the relative payloads that may be carried for different durations by helicopters using the more important rotor propulsion systems.

The basic rotor power requirements, and the airflame and rotor weights used in this report are scaled from those of the Bell Model 47, three-place helicopter. Basic gas turbine weights used are scaled from those of a proposed, 6:1 pressure ratio, 500 bhp gas turbine design, suitable for a somewhat larger helicopter. Results of this study may, however, be considered generally applicable to helicopters from three through perhaps 40-place, the helicopter sizes for which mechanical rotor drives are entirely practical.

ESTIMATED SMALL GAS TURBINES' PERFORMANCE

Basis is one lb per sec air flow, at design point, and 100 pct turbine speed

	Sea Level		4000 ft		8000 ft		12,000 ft	
Pressure Altitude	Std.	Hot	Std.	Hot	Std.	Hot	Std.	Hot
°F	59.000	100.40	44.735	86.00	30.471	71.600	16.206	57.200
°R	518.400	559.80	504.135	545.40	489.871	531.00	475.626	516.60
$\frac{P}{P^o}$	1.0000	1.0000	.9636	.8636	.7427	.7427	.6359	.6359
Chart shp/lb of air per sec at design point	78.0	67.3	82.7	71.5	87.7	75.0	93.0	78.5
Shp/lb of air per sec at design point	78.0	67.3	71.35	61.65	65.2	55.7	59.1	49.9
Pct of sea level standard	1.00	.863	.915	.791	.836	.714	.758	.640

Sea Level Standard, Fuel Consumption Rates (100 pct Turbine Speed)				
Pct compressor rpm	85	90	95	100
Lb fuel/hr	31.5	38.5	48.0	59.8
Shp	33.0	45.5	60.3	78.0
Specific fuel consumption, lb/bhp hr	.955	.846	.796	.767
Pct of 100 pct speed value	1.244	1.102	1.038	1.00
Pct of 100 pct power	.423	.583	.773	1.00

Fig. 2—Design potential of a small four place helicopter powered by a mechanical drive gas turbine engine.

Gas turbine powers are conservatively selected to give sufficient power to hover out-of-ground-effect on a 100 F day, at sea level pressure altitude.

In considering the calculated results on a non-dimensional basis it is convenient to define payload as equal to the useful load minus the fuel weight. Crew weight is thus included in the payload.

To a rough first approximation helicopter, first cost and maintenance expense are proportional to empty weight. The ratio of the above defined payload to the empty weight will thus be taken to be a measure of the relative worth of a given helicopter design.

In Fig. 1, the ratio of payload empty weight is plotted as a function of the hours of cruising fuel carried. The propulsion system giving the highest ratio at a particular duration is considered to be best.

Small commercial helicopters have normally carried enough fuel for two-hr at cruising speed. Most military helicopters require at least three of four hr of fuel.

The pressure jet system is seen to be as good as the conventional reciprocating engine machine, up to two-hr duration. Because of this fact, and the possible application of this system to convertiplanes requiring rotor power only for short periods at take-off, this system will continue to be developed.

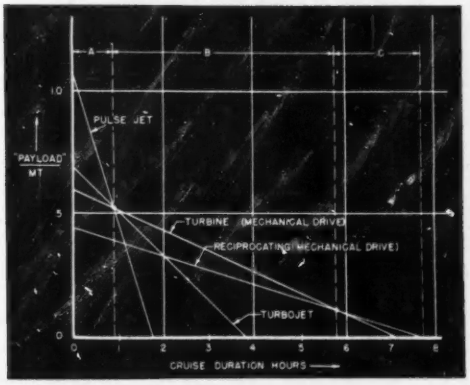
For very short duration machines less than 54 min the pulse jet is seen to give the best results.

But for the great majority of practical helicopters—one to six hr duration—a gas turbine driving its rotors through a mechanical transmission is seen to give best results. As such a machine can also take advantage of:

1. The high power weight ratio of gas turbines and absence of blade tip unit drags, to attain highest possible helicopter performance.
2. Small size and weight of gas turbines, permitting

(*Turn to page* 116, *please*)

Fig. 1—Ratio of payload empty weight is plotted as a function of the hours of cruising fuel carried.



Guest Executives at Detroit Conference

Republic Gage Co., Detroit
R. E. Lamb, President

Minnesota Mining & Mfg. Co., Detroit
Walter S. Meyers, Asst. to Executive Vice Pres.

Aeroquip Corp., Jackson, Mich.
William E. Wygant, Controller
F. M. Davison, Asst. Treasurer

Vinco Corp., Detroit
Howard W. Ruck, Factory Accountant
George E. Stansfield, Accounting Supervisor

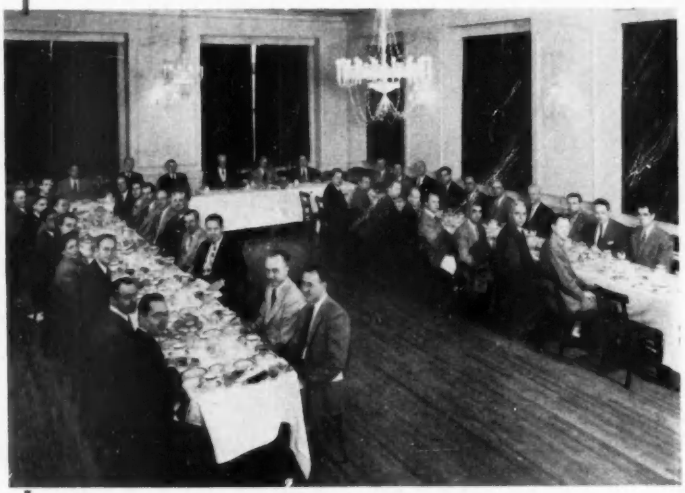
Lear, Inc., Grand Rapids, Mich.
F. D. Beamer, Asst. Treasurer
Glen C. Warman, Chief Accountant

Morse Chain Co. (Borg-Warner), Detroit
E. G. Wuensch, Asst. Treasurer
A. K. Hahn, Chief Accountant
F. C. Stark, Plant Accountant

Ford Motor Co., Dearborn, Mich.
Virgil LaMarre

Zenith Carb. Div., Bendix Aviation, Detroit
A. E. Versluis, Div. Comptroller

Evans Products Co., Plymouth, Mich.
J. M. Russell, Controller
J. Merrell, Jr., Accountant



Monroe Auto Equipment Co., Monroe, Mich.
William L. Woodward, Jr., Contract Coordinator
Robert P. Barfan, Asst. Controller

Detroit Sheet Metal Co., Detroit
Mrs. Rose Schearer, Office Manager
Joseph N. Jennings, CPA
Ward D. Powers, Lawyer

Long Mfg. Div. (Borg-Warner), Detroit
R. L. Schmidt, Manager Costs
J. A. Depa, Accountant

Bundy Tubing Co., Detroit
J. W. Baker, Asst. Controller

Newcomb-Detroit Co., Detroit
Jack H. Gowan, Secretary

Kold-Hold Mfg. Co., Lansing, Mich.
I. E. Davenport, Credit Manager
Wesley Yard, Cost Accountant

AC Spark Plug Div., General Motors, Flint, Mich.
H. C. Young, Div. Comptroller

Fuller Mfg. Co., Kalamazoo, Mich.
J. H. Burling, Asst. Comptroller

Claude B. Schneible Co., Detroit
W. E. Renner

American Brakeblok Div., American Brake Shoe Co., Detroit
John W. Eckwert, Asst. Comptroller
A. J. Moeser, Detroit Accountant

Skinner Purifiers Div., Bendix Aviation Corp., Detroit
D. W. Hunt, Divisional Comptroller

Parker Rust Proof Co., Detroit
J. R. Hartley

Price, Waterhouse & Co., Detroit
E. C. Suor, Principal
R. W. Brown, Senior Accountant

The Detroit Bank, Detroit
George L. Hawkins, Asst. Cashier

Ernst & Ernst, Detroit
F. I. Dobson

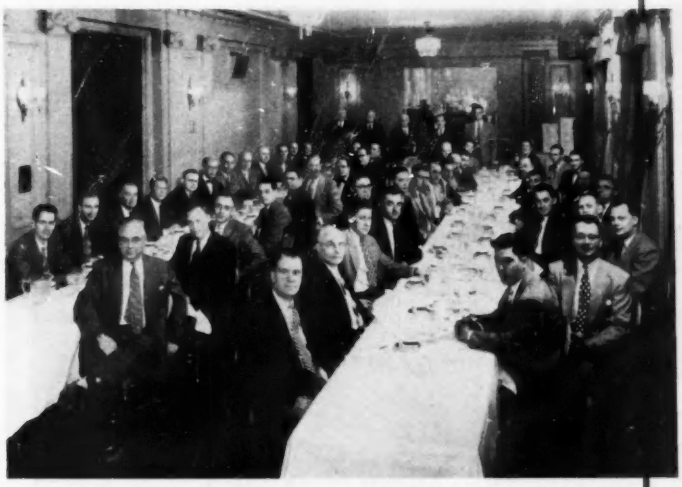
Renegotiation Conferences in Five Industrial Centers

Current Problems Analyzed at Automotive Industries Management Sessions Attended by Key Officials from 107 Companies

By James R. Custer

THE fast growing interest in the problems of defense contract renegotiation was manifested at the regional management conferences sponsored on that subject by AUTOMOTIVE INDUSTRIES during the week of May 12 in five industrial centers of the Midwest. These conferences, which began at Rockford, Ill., and continued on successive days at Chicago, Milwaukee, Indianapolis and Detroit, were attended by 190 executives representing 107 companies. They are listed with the pictorial presentations accompanying this article.

The May management meetings were a continuation of the series that was inaugurated in September of last year to extend the editorial service of AUTOMOTIVE INDUSTRIES and thus give company executives an opportunity to discuss their renegotiation problems and exchange experiences. To



date 14 meetings have been held in 12 cities, including Philadelphia, Hartford, Buffalo, Cleveland, Cincinnati, Pittsburgh, and Dayton, plus the five cities mentioned above. The total attendance was 475 key executives from 262 companies, trade associations, banking and accounting firms.

All of the conferences were addressed by Kenneth G. Smith, formerly a member of the Army Signal Corps Renegotiation Panel during World War II and since then has been a financial and renegotiation consultant to several companies. It was his article, "How to Protect Yourself for Renegotiation," published in the July 15, 1951 issue of AUTOMOTIVE INDUSTRIES, that led to this series of management conferences as the result of the widespread interest shown in the article by a number of companies, trade associations, and banks, which requested reprints of it and specific information. At each conference interest in this vital subject reached a peak during the question and discussion period.

Factors in Renegotiation

At the May meetings, in addition to reviewing his personal experiences and various factors involved in the renegotiation of Defense contracts under the 1951 Act, Mr. Smith devoted most of his talks to analyzing the new regulations and policies announced recently by the Renegotiation Board. Among the factors explained were segregation of sales, distribution of costs, efficiency of the contractor and the risk assumed, character of the business and recognition with respect to its industry, profits, and others. In discussing segregation of sales, Mr. Smith used two charts giving a detailed breakdown of sales subject to renegotiation and those that are exempt. The two charts are illustrated in part on the last page of this article. Some of the highlights of his talk follow:

The ability to segregate sales properly and arrive at an answer that is fair to the Government and the contractor is of prime importance and requires a thorough knowledge

Guest Executives at Chicago Conference

Tuthill Spring Co., Chicago
H. T. Moore, President
S. M. Ziolko, Treasurer

Imperial Brass Mfg. Co., Chicago
F. G. Haris, Secretary and Controller
Frank C. Gentile, Jr., Special Assignment

Synchro-Start Products, Inc., Skokie, Ill.
William J. Williams, President

Magnesium Co. of America, East Chicago, Ind.
Alex Russell, Treasurer

Alumicast Corp., Chicago
Lester C. Nelson, Treasurer

G. S. Blakeslee & Co., Cicero, Ill.
Theodore V. Tegger, Asst. Treasurer

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Robert G. Lambrecht, Purchasing Agent
J. E. Connell, Cost Accountant

Inland Steel Co., Chicago
Frank G. Johnson
Quentin E. Samuelson
J. E. Clermont, Auditor
William E. Geidt, Adv. Mgr.

Danly Machine Specialties, Inc., Chicago
Frank A. Furar, Controller
Robert C. Berggren, Adv. Mgr.

Reeve Electronics, Inc., Chicago
John R. Guenther, President
G. L. Steichmann, Vice Pres. & Treas.

Clark Equipment Co., Buchanan, Mich.
H. D. Nelson, Comptroller

Cardox Corp., Chicago
Felix C. Rodgers, General Mgr. (Fire Div.)
John J. Fitzgerald, Secretary Comptroller

Borg-Warner Corp.
Marvel-Schebler Brake Div., Decatur, Ill.
R. D. Turner, Secretary-Treasurer

Gits Bros. Mfg. Co., Chicago
Remi J. Gits, President
Richard W. Barz, Sales Mgr.
W. L. Tutskey, Chief Accountant

United Specialties Co., Chicago
A. Vander Meulen, Vice President
Byron H. Fretz, Secretary & Asst. Treas.

Chicago Rivet and Machine Co., Bellwood, Ill.
Walter Bautz, Controller
Reinhold Groh, CPA

Kester Solder Co., Chicago
M. J. Sweeney, Comptroller

Pines Engineering Co., Inc., Aurora, Ill.
Fred F. Klebe, Controller & Asst. Sec.
J. E. Hawking, Sales Mgr.

Verson AllSteel Press Co., Chicago
Damien J. Ward, Accountant

Strom Steel Ball Co., Cicero, Ill.
R. G. Ely, Secretary-Treasurer

J. J. Tourek Mfg. Co., Chicago
Gil Davies, Vice President

Auto Specialties Mfg. Co., St. Joseph, Mich.
A. H. Zick, Vice Pres. & Controller
John B. Engelbreit, Auditor
Paul R. Berndt, Office Manager

Sun Electric Corp., Chicago
W. W. Squier, Vice President
H. M. Coffman, Secretary-Treasurer

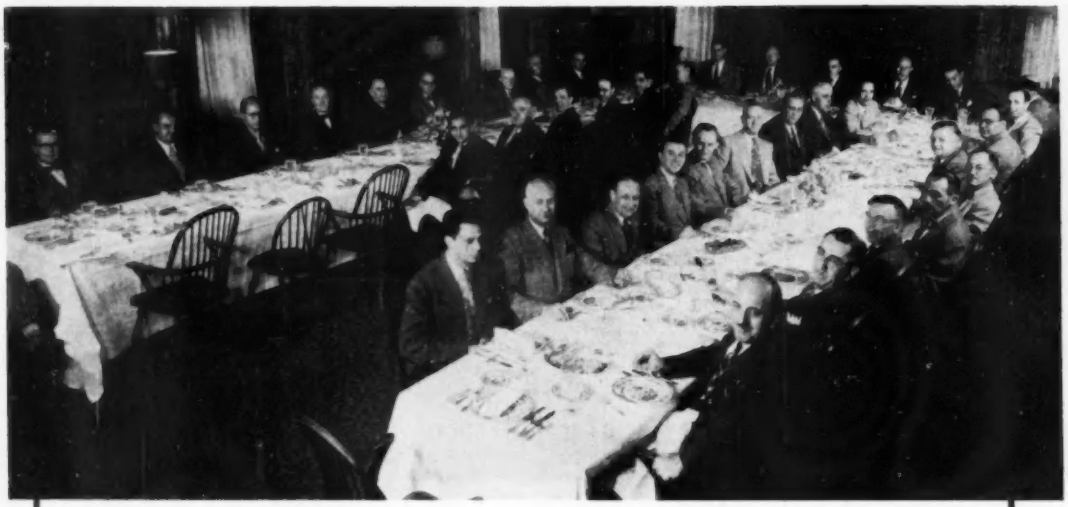
Haskins & Sells, Chicago
C. F. Lemons, Principal

Kropp Forge Co., Chicago
A. F. Tydeman, Assistant Secretary

Nash Bros. Co., Evanston, Ill.
E. A. Seward, Secretary-Treasurer

Chamber of Commerce, Mishawaka, Ind.
Ferd Krueckeberg, Secretary-Manager

P. A. Sturtevant Co., Elmhurst, Ill.
R. K. Shirer, Controls Manager



Kearney & Trecker Corp., West Allis, Wis.
R. A. Perkins, Controller, Asst Secy., & Asst. Treas.
George A. Becker, Chief Accountant
Art Searing, Chief of Renegotiation
Alphons J. John, Dir. Adv. & Pub. Relations

Wisconsin Motor Corp., Milwaukee
H. A. Todd, President
Harry Cronk, Vice President
R. H. Matzen, Asst. Secy. & Treas.

Twin Disc Clutch Co., Racine, Wis.
R. T. Howell, Treasurer

Young Radiator Co., Racine, Wis.
Walter H. Schleck, Secretary-Treasurer
H. J. Esgorsheck, Asst. Treas.

Black Hawk Mfg. Co., Milwaukee
L. B. Trovinger, Asst. Controller

Stolper Steel Products Corp., Menomonee Falls, Wis.
O. H. Kessler, Jr., Vice President

Taylor Dynamometer & Machine Co., Milwaukee
C. E. Chavez, Partner

Unit Crane Shovel Corp., Milwaukee
Arthur B. Py, Asst. to President
W. P. Matschke, Asst. Controller

Dynamatic Corp., Kenosha, Wis.
J. P. Dorau, Controller

Le Roi Co., Milwaukee
G. J. Hamm, Secy. & Treas.
Ray L. Pierson, Administrative Accountant

Davis & Thompson Co., Milwaukee
J. A. Hauser, Asst. to President

Nevi Duty Electric Co., Milwaukee
Walter A. Schwarting

Kempsmith Machine Co., West Allis, Wis.
R. Dulde, Vice President
L. H. Malsack, Secy. & Treas.

Globe-Union, Inc., Milwaukee
R. W. Conway, Treasurer
Angus B. Morse, Dir. of Adv.

Mercury Engineering Corp., Milwaukee
Don L. Hare, Treasurer
R. O. Martin, Vice President

Milsco Mfg. Co., Milwaukee
W. H. Bartels, Controller
Louis L. Mueller, Personnel Director

Waukesha Motor Co., Waukesha, Wis.
J. E. DeLong, President
Harry J. Lemmer, Adv. Mgr.

Perfex Corp., Milwaukee
V. R. Tate, Executive Vice Pres.
H. J. Schroeder, Treasurer
Bradford W. Shepard, Sales Coordinator

A. O. Smith Corp., Milwaukee
Arthur A. Widtmann, Adm. Asst., Office of Vice Pres.
R. L. Wirsbinski, Govt. Contract Office, Office of Controller

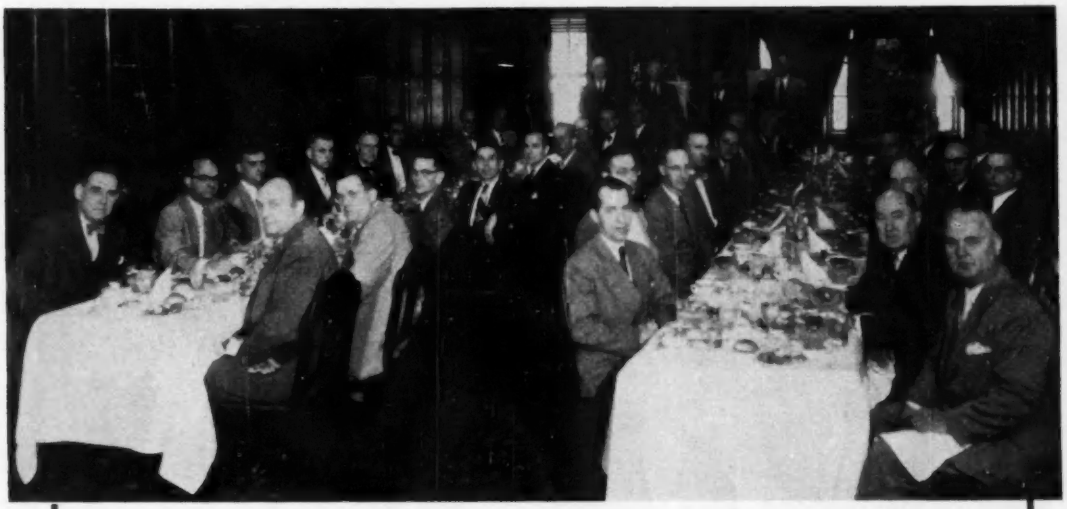
Guest Executives at Milwaukee Conference

of the end use of the company's products. Without a full realization of what constitutes renegotiable business, a segregation of sales is of little value. It must be realized that there are now 15 agencies or departments of the Federal government whose contracts are subject to renegotiation. Approximately 28 different contract key symbols indicate that as whether a contract that has been issued by an agency must be renegotiated.

Under existing regulations there are more than 50 CMP or DO symbols, which have been allotted to agencies, not to mention a like amount of the old DO numbers, which have been used by prime contractors and agencies when ordering materials necessary for Defense work. These symbols are an indication that the sale may be subject to renegotiation. In addition, some 65 business organizations, universities, and special purchasing offices of the Atomic Energy Commission are acquiring materials which are subject to renegotiation.

Common Pitfalls

Management in approaching the problem of renegotiation must realize that there is no typical renegotiation case. Each proceeding covers factors not necessarily similar to other companies. What, therefore, are the pitfalls which many corporate officials have already made and will continue to make?



Guest Executives at Indianapolis Conference

Diamond Chain Co., Inc., Indianapolis
Dale R. Hodges, Secretary-Treasurer
A. S. Basten, Sales Manager
H. L. Martin, Mgr. of Adv.

George S. Olive & Co., Indianapolis
John T. Kokos, Staff Accountant

Ernst & Ernst, Indianapolis
J. L. Bubul, Asst. Manager

Whittington Pump & Engineering Corp., Indianapolis
Dick W. Whittington, President
Lorance E. Sterns, Chief Engineer

Ross Gear & Tool Co., Lafayette, Ind.
O. J. Norris, Treasurer

P. R. Mallory & Co., Inc., Indianapolis
M. E. Hamilton, Vice Pres.-Treasurer
Richard W. Lee, Asst. Treasurer

Service Spring Co., Indianapolis
A. W. Hendrickson, Vice President

Cummins Engine Co., Inc., Columbus, Ind.
Paul R. Cannon, Jr., Supervisor of Internal Auditing
D. L. Mellencamp, Supervisor of Budget Acct.

Fairfield Mfg. Co., Lafayette, Ind.
D. D. Siegrist, Asst. Treasurer
D. W. Owens, Sales Manager

Merz Engineering, Inc., Indianapolis
Katharine Roessner, Secretary-Treasurer
Arthur M. Love, Sales Engineer

Indiana Gear Works, Inc., Indianapolis
W. D. Reed, Chief Accountant
Herbert Luzader, Asst. to Chief Accountant

Schwitzer-Cummins Co., Indianapolis
George M. Warmoth, Asst. Controller
Verne W. Bailie, Internal Auditor

Link Belt Co., Indianapolis
W. G. Bally, Mgr. Auto and Diesel Chain Sales
R. E. Hiner, Plant Accountant
Frank L. Walters, Asst. Plant Accountant

Nevi Duty Electric Co., Milwaukee, Wis.
L. B. Lattin, Asst. to President

Stewart-Warner Corp., Chicago, Ill.
Ted Grange, Director of Public Relations
Warren Coughlin, Asst. Dir. Public Relations

Stewart-Warner Corp., South Wind Div., Indianapolis
R. C. Overmyer, Adv. Mgr.
R. C. Crews, General Accountant
Charles B. Clark, Factory Accountant

Industrial Filtration Co., Lebanon, Ind.
Paul R. Honan, Partner
N. B. Waggener, Office Manager
Quentin Covert, CPA

Steel-Bronze Sealing Rings Co., Indianapolis
George Deeb, Sr., President & Sales Mgr.
Frank L. Alford, Auditor

1. "We have been through this before" attitude, "and we know all the answers."
2. Sit tight until the Renegotiation Board finds us.
3. The information is not due until after the Income Tax Return is filed and must take its turn.
4. Since renegotiation requires a segregation of sales and allocation of costs, it is an accounting job, so the accountant is placed in charge.

Figures are the backbone of the report. However, in the final analysis the determination received is predicated upon the thoroughness of the written report. Build your files now, it is an all year round job.

Outline for Preparation of a Report

1. Accounting
   - *a.* Segregation of sales
     1. Accounting aspects
     2. Legal interpretations
     3. Method or base for segregating sales
   - *b.* Allocation of costs
     1. Sales ratio
     2. Actual
     3. Combination of actual and sales
     4. Special methods
2. Research

The accumulation of material is necessary for a good written report and the type of material depends upon the company and the renegotiation program adopted by the company. (*Continued on next page*)

Guest Executives at Rockford Conference

Excelsior Leather Washer Mfg. Co., Rockford
C. E. Duclon, President
W. E. Duclon, Sales Manager

Elco Tool and Screw Corp., Rockford
F. P. Walker, Controller
Walter G. Larson, Adv. Mgr.

Ekstrom, Carlson & Co., Rockford
Fred J. Heid, General Sales Mgr.
Mason Satterthwaite, Accountant

Barber-Coleman Co., Rockford
J. G. Jones, Secretary
Robert A. Horner, Sales Manager

Borg-Warner Corp., Mechanics Universal Joint Div., Rockford
Fred M. Potgieter, Vice Pres.-Sales
C. F. Schwartz, Secretary & Treasurer
L. J. Lozinski, Asst. to Controller
W. J. Simpson, Factory Sales Manager

W. F. & John Barnes Co., Rockford
Frank Roos, Asst. Controller

Rockford Machine Tool Co., Rockford
Elmer E. Hallberg, Vice President
Wilbur F. Merkle, Secretary

Greenlee Bros. & Co., Rockford
Clifford G. Wood, Secretary
W. A. Sills, Auditor
Roscoe E. Brightup, Adv. Mgr.

Ingersoll Milling Machine Co., Rockford
Sheldon L. Spelman, Controller

Barnes Drill Co., Rockford
A. G. Block, Vice Pres., Sec., & Treas.
Noel D. O'Daniell, Adv. Mgr.

Gunite Foundries Corp., Rockford
Noble J. Schmidt, Secretary-Treasurer
F. A. Christoffer, Sales Manager

Woodward Governor Co., Rockford
Ward A. Ring, Vice President
Ralph E. Johnson, Accounting Dept.

Mattison Machine Works, Rockford
R. W. Cadwell, Comptroller

George D. Roper Corp., Rockford
C. R. Oehler, Controller
C. A. Miller, Asst. Controller

Camcar Screw & Mfg. Corp., Rockford
Fred W. Wolter, Chief Accountant

Cotta Transmission Co., Rockford
A. D. Scoville, General Manager
H. B. Scoville, Asst. General Manager

Sunstrand Machine Tool Co., Rockford
J. E. McCann, Asst. to Treasurer
Alfred N. Moore, Renegotiation Accountant

Borg-Warner Corp., Rockford Clutch Div., Rockford
F. M. Palmquist, Secretary-Treasurer
G. L. Christianson, Asst. General Manager
E. R. Williams, Asst. Sales Manager

The current law covers the three-year period — 1951 through 1953. It is highly desirable for management to lay out a renegotiation program of action for the accumulation and presentation of material to the Renegotiation Board. It is wishful thinking to believe that the outcome of the Korean incident will determine the course of renegotiation.

3. Report

A company is in business to make profits. For this reason management should not delay until some months after the year's end before considering the composition of the report. This important document should be on the highest editorial plane your company can reach.

Stock Item Purchases

Subcontracts for materials which the purchaser customarily buys for stock in the normal course of his business are exempt from renegotiation. The items are small, such

Sales Subject to Renegotiation

SEGREGATION OF SALES CHART – RENEGOTIATION ACT OF 1951
SALES SUBJECT TO RENEGOTIATION

RENEGOTIABLE CONTRACT SYMBOLS Test: Contracts or Purchase Orders bearing Contract Number Preceded by Symbols below are Subject to Renegotiation.	
AEC-PS	Atomic Energy Commission (1)
AF	Department of the Air Force
ASP	Armed Services Petroleum Purchasing Agency
AT	Atomic Energy Commission (2)
CAC	Division of Accounting Control, Dept. of Com.
CC	Dept. of Commerce, Office of the Secretary
CCANA	Washington National Airport, Dept. of Com.
CD	Federal Civil Defense Administration
CG	United States Coast Guard
CST	Bureau of Standards, Dept. of Com.
DA	Department of the Army (3)
FMB	Federal Maritime Board, Dept. of Com.
GS	General Services Administration

ALLOTMENT NUMBERS, SYMBOLS & DO RATINGS ON CMP AUTHORIZATIONS Test: Contracts and Purchase Orders with Symbols below may be considered as Subject to Renegotiation unless advised otherwise by Purchaser.		
A-1	Aircraft	Department of Defense
A-2	Guided Missiles	" "
A-3	Ships	" "
A-4	Tank-Automotive	" "
A-5	Weapons	" "
A-6	Ammunition	" "
A-7	Electronic & Communications Equip't.	" "
A-8	Fuels & Lubricants	" "
A-9	Clothing & Equipage	" "
B-1	Bldg. Supplies & Equip't for Construction Troops	" "
B-2	Subsistence	" "
B-3	Transportation - E...	
B-4		

OLD DO-NUMBERS USED ON RENEGOTIABLE CONTRACTS Test: Contracts and Purchase orders with Symbols below may be considered as Subject to Renegotiation unless advised otherwise by Purchaser.	
DEPARTMENT OF DEFENSE	
DO-01	Aircraft
DO-02	Guided Missiles
DO-03	Ships
DO-04	Tank-Automotive
DO-05	Weapons
DO-06	Ammunition
	Electronics & Communications Equipment

ATOMIC ENERGY COMMISSION Companies Acting as Procurement Agencies for AEC. All purchases under this Program are Subject to Renegotiation.
American Industrial Transport, Inc.
American Smelting & Refining Co.
Ames Area Office
Anderson County Board of Education
Argonne National Laboratory
Associated Universities, Inc.
Battelle Memorial Institute
Berkeley Area Office
Beryllium Corp.
Brook... National Lab...

Sales Exempt from Renegotiation

SEGREGATION OF SALES CHART - RENEGOTIATION ACT OF 1951

Sales Exempt from Renegotiation

MANDATORY EXEMPTIONS

1. Contracts with other Governmental Agencies
   NOTE: Includes any contract by a Department with any;
   a. Territory b. Possession
   c. State d. Foreign Government
   e. Any agency or political subdivision of a State
   f. Municipal Corporation

2. Cost Allowance for Agricultural Commodities and Raw Materials in the case of integrated producers. NOTE: ... the amount normal...

PERMISSIVE EXEMPTIONS

Prime Contracts and Sub-contracts to be Performed Outside of the United States

NOTE; Board has the authority to exempt the following:
1. Any contract or sub-contract to be performed outside the territorial limits of the Continental United States or in Alaska and related contracts.
2. Prime Contracts and related sub-contracts of the Panama Canal Co., and the Canal Zone Government in amount less than $10,000.00 for products manufactured in the Republic of Panama.
3. Prime Contracts under which profits can be determined ... established, such ...

RAW MATERIALS MANDATORY EXEMPTION LIST

Any Contracts or Sub-contracts for the product of a mine, oil or gas well, or other mineral or natural deposit, or timber, which has not been processed, refined, or treated beyond the first form or state suitable for industrial use.

Aggregates including such items as washed or screened sand, gravel, or crushed stone
Alumina; Aluminum Sulfate; aluminum ingots and pigs.
Asphalt, natural.
Antimony ore, crude; antimony ore, concentrated; antimony ... de

Mica, crude, hand-cobbed, block mica; sheet mica, including splittings, wet or dry ground mica.
Molybdenum ore and concentrates; molybdenum oxide; calcium molybdate; ferromolybdenum.
Monel ore; monel matte; monel ingots, pigs, and shot, produced from monel matte.

MANDATORY EXEMPTION LIST

Last Former State at Which Exemption is to Apply

Threshed
Crude or "Country Run"
Fresh
As Bark (Unprocessed)
Fermented and Dried
Beans (Green)
As Grain (Shelled)
Ginned (In the bale)
Unprocessed (as they come from the gin)
As sold from Farms (not pasteurized)
... (unground ...

as nuts and bolts, and are used in volume, therefore making it difficult to trace the end use. However, at times an order may state that the purchase of a special lot has a Defense end use, thus making the order renegotiable.

Briefly, the stock item exemption is intended to relieve a company of the burden of segregation where tracing the end use is not practicable since the customer places the item in stock for future use on such orders which he may receive.

Maintenance and Repair Orders

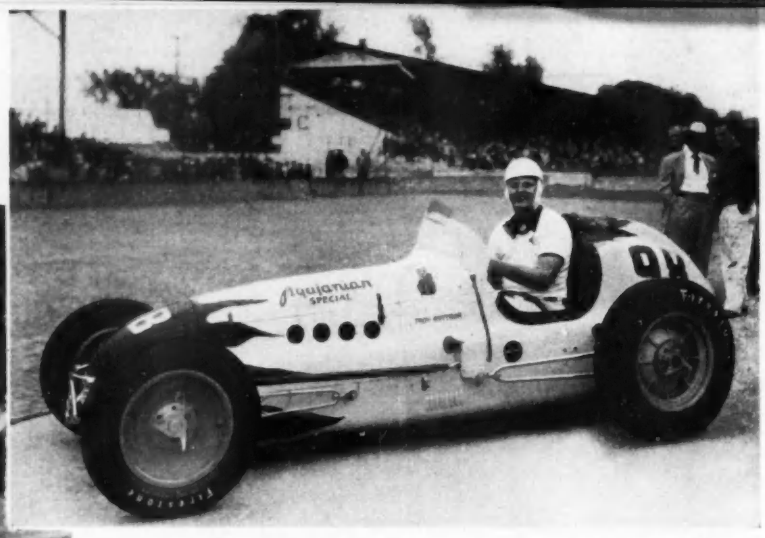
Subcontracts for general plant maintenance and repair materials are exempt from renegotiation when they are retained by the purchaser. In turn prime contracts for maintenance and repair parts are subject to the Act. Sales along the following lines are considered to be exempt:

1. Materials for general plant maintenance, including fuel and equipment to produce light, heat and general power requirements.

2. Materials for general office purposes.

3. Materials used in processing, other than those entering into an end product to be delivered to the Government.

If, however, you sell materials or equipment which process an end product or part of an end product for the Government, then they are subject to renegotiation.



The winning Agajanian Special with Troy Ruttman of Lynwood, Calif., at the wheel. This rear-drive car is powered by a Meyer-Drake four-cyl. 270 cu in. engine. Clay Smith assembled and prepared the car in 1951. Ed Kuzma built the body and sheet metal parts. O'Dell-Shields photo.

Troy Ruttman, first across the finish line. International News Photo.

Another Fastest Five Hundred

By

Robert T. Jackson

Perfect Circle Corp.

TROY RUTTMAN, youthful in years but accomplished veteran in experience, won the Indianapolis 500 mile race at the amazing average speed of 128.992 mph, climaxing a classic of terriffic competition during which all existing records for the course were again shattered by substantial margins.

Ruttman, the winner, and Jim Rathman, the runner-up, easily rate the title of duellists of the day for the intensity of their efforts. Running second and third, respectively, throughout most of the contest, they staged numerous close brushes while the race was yet young. Beginning about the 35th lap these hurrying youngsters—Rathman, like Ruttman, is said to be barely past his majority—put on a duel for which this observer has seen no equal in some 30 years acquaintance with the big loop.

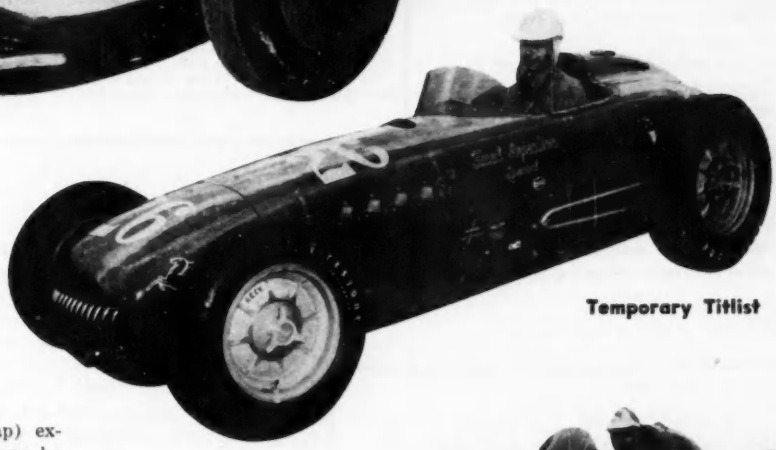
This story, however, is not *the* feature of the 1952 race. The real story of the day, even though it doesn't have a very happy ending, was the heroic drive of Bill Vukovich, in his Fuel Injection Special, to a leadership of the race which he held in predominant style *almost* literally from start to finish.

From his starting position in the center of the third row Vukovich began a drive which had him in third place in two laps. At the end of six he was leading, a command which he held until his first

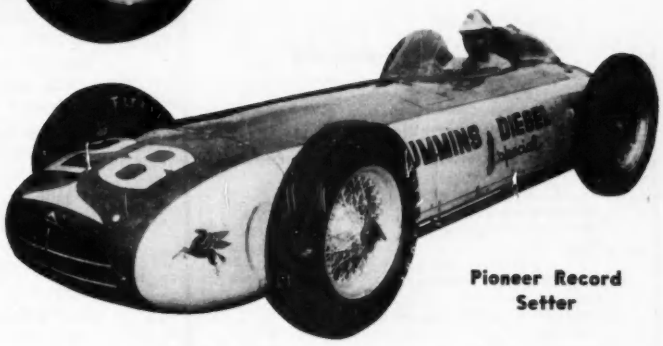
THROTTLE-HEAVY TRIUMVIRATE

Three Successive Qualifying Records

Qualifying Champ—1952



Temporary Titlist



Pioneer Record Setter

pit stop (about 60th lap) except for a brief challenge by Ruttman on the 12th lap during which the fleeting pair passed and repassed each other.

Rathman, who had jumped from his starting position in the *fourth* row to second place in the first lap, gave way to Ruttman at the end of that lap but continued to hold a very close third until Vukovich, on his way forward, overtook him. Jack McGrath, who took the early lead, held it until Vukovich took over and then fell back in the field to fourth where he ran until his first pit stop. After that McGrath, who had trouble with a sticking throttle shaft, was never a serious contender.

Meanwhile Vukovich, Ruttman, and Rathman, in that order, were rapidly pulling away from the rest of the field. Vukovich, according to this reporter's chronograph, ran several laps at or near 134 mph but his pursuers were actually

QUALIFYING CHAMP—1952

Chet Miller in his track-blistering No. 21 Novi Pure Oil Special just after setting an all-time qualifying record of 139.034 mph on May 26. In a previous attempt he ran one lap at over 140 mph and had several other 140 plus laps unofficially. But his best lap on the record-breaking run was 139.513 mph. Previous records were set by Bill Vukovich on May 24, 1952. Photo by Roy J. Harper.

TEMPORARY TITLIST

For all of two days Bill Vukovich held the one and four lap Indianapolis qualifying records, having qualified at 138.212 on May 24. His best lap was also a new record—139.427. Previous records were established by Freddie Agabashian on May 17, 1952. Photo by Roy J. Harper.

PIONEER RECORD SETTER

Freddie Agabashian, in his No. 28 Cummins Diesel Spl. electrified a vast crowd by a brilliant drive to new one and four lap Indianapolis qualifying records on May 17. He qualified at 138.010 mph, with best lap of 139.104. Previous records were established by Walt Faulkner in 1951. In 1950 the Cummins entry started the race from 33rd position. In just two years they developed the present design and put it into 1st (pole) starting position for the 1952 race—a most impressive accomplishment. Photo by Roy J. Harper.

not far behind him. For twelve or fifteen laps this trio was never stretched out more than 15 seconds from first to third. At 40 laps Vukovich had increased his average speed to 133.008 (Lee Wallard set the previous 40 lap mark in 1951 at 130.626).

Vukovich's first pit stop pulled him out of the lead, which fell to Ruttman, who then led until his own first pit stop (at 82 laps) when Vukovich, who had been clawing his way back up front, again took over.

At this point a running account of the race becomes rather simple: Vukovich resumed his command at 82 laps and held it until his 134th; Ruttman took over then when Vukovich made his second pit stop; Ruttman led to the time of *his* second pit stop and Vukovich regained the lead. He held it with margins varying from 40 odd seconds ahead of Ruttman down to less than 20, which came to pass at about Vukovich's 190th lap in the race.

Then the fortunes of the game came into play. Vukovich, who had been running well if not consistently, was forced from the race with victory almost in his hands when a steering gear part failed and his car kissed the northeast wall without injury to him. Vukovich, who had led 150 odd laps of the most highly competitive Indianapolis racing of all time, was thus forcibly retired and his arch-contender of the day, Troy Ruttman, went on to the winner's ovation.

The real story of the race was Vukovich but to the victor belong the spoils and Ruttman was the winner. Behind the results were several conditions which would appear to be interesting. First, Vukovich had enough speed to do the job—he was able to hold a lead over his nearest rival, and increase it when necessary. Further, he was able to use it well enough to build up a sufficient lead between pit stops so that the next stop to be made would not dump him back into the ruck of the contest. He showed this capacity to perfection between his first and second stops.

Second, the pit work of the rival crews was good, or at least good enough. Ruttman's crew made two fine stops. The Vukovich crew didn't do quite so well. They made an error on their second stop which cost Vukovich a part of the lead he had fought so hard to obtain. When he went out again he was about 30 seconds behind Ruttman and it could just as well have been even or not more than ten seconds. But that sort of thing is a part of the game and accepted as such by the crews. In this case it didn't count too much because Ruttman still had another stop to make.

Rathman, the ultimate second place winner, had to make three pit stops and thus could not maintain a threatening position throughout the race. His pit work was very good, however, and he was

Records—New and Old

	NEW RECORDS			OLD RECORDS		
Miles	Laps	Speed	Driver	Speed	Driver	Year
10	4	131.497	McGrath	126.711	Nalon	1949
25	10	132.536	Vukovich	128.249	McGrath	1951
50	20	132.964	Vukovich	129.529	Wallard	1951
75	30	132.816	Vukovich	130.468	Wallard	1951
100	40	133.008	Vukovich	130.626	Wallard	1951
125	50	132.726	Vukovich	130.479	Wallard	1951
150	60	132.502	Vukovich	128.453	Davies	1951
175	70	131.149	Ruttman	127.882	Davies	1951
200	80	130.832	Ruttman	127.502	Green	1951
225	90	129.988	Vukovich	127.174	Wallard	1951
250	100	130.142	Vukovich	127.219	Wallard	1951
275	110	130.223	Vukovich	127.268	Wallard	1951
300	120	130.378	Vukovich	127.207	Wallard	1951
325	130	130.548	Vukovich	127.121	Wallard	1951
350	140	129.043	Ruttman	126.997	Wallard	1951
375	150	128.811	Vukovich	126.908	Wallard	1951
400	160	128.974	Vukovich	126.798	Wallard	1951
425	170	129.128	Vukovich	126.643	Wallard	1951
450	180	129.258	Vukovich	126.505	Wallard	1951
475	190	129.266	Vukovich	126.384	Wallard	1951
500	200	128.922	Ruttman	126.244	Wallard	1951

Statistical Highlights

POWER PLANTS	CU IN.	
Largest engine in race—Cummins Diesel	400.9*	6 cyl (s)
Largest unblown 4 cyl—Bob Estes Spl.	273.6	4 cyl
Smallest engine in race—Miracle Power	179.6	4 cyl (s)
Ferrari engine (Bore & Stroke 3.1 × 2.9 in.)	267.3	12 cyl

CAR WEIGHTS (dry)	
Heaviest car in race—Cummins Diesel	2480 lb
Lightest car in race—Bob Estes Spl.	1531 lb
Ferrari	1731 lb

WHEELBASE	
Longest car in race—Novi Pure Oil Spls.	106 in.
Shortest car in race—Fuel Injection Spl. (And other late-type Kurtis-Kraft)	96 in.
Ferrari	100 in.

ACCESSORIES

All cars used Champion spark plugs except the Blue Crown plugs used by Specials of the same name driven by Henry Banks and Tony Bettenhausen and the Bowes plugs used in the Bowes Seal Fast Special driven by Art Cross.

All cars except Ascari's Ferrari and Bettenhausen's Blue Crown Spl. used Perfect Circle rings. Rings used in the Ferrari are not identified. Bettenhausen's car used Burd rings.

Magnetos used were Bosch (both American and German) and Scintilla.

Most 270's were equipped with fuel injection.

FUEL

All cars qualified on methanol and/or blends of the same.

* By special provision in Indianapolis Race Rules.

(s) Supercharged.

Type of frame structure and front suspension used on Car No. 26. The Fuel Injection Spl. driven by Bill Vukovich. Note torsion bar and radius arm layout. This system has a conventional front axle. Chassis frame is of composite construction —inner channel (provided with numerous lightening holes) is formed from 4130 sheet steel. Outer web is aluminum alloy. Top and bottom flanges of these members are riveted to form a box section as shown. Car is latest-type Kurtis-Kraft, powered by a Meyer-Drake 270. (See Automotive Industries for May 1, 1952, page 40.) Photo by Robert T. Jackson.

never out of serious contention.

Sam Hanks, who finished third, ran well throughout the contest, but had to make four pit stops and so lost considerable time. Duane Carter reached his fourth place with but one pit stop, although he was obviously maintaining a more conservative pace throughout—probably to favor his tires.

On the subject of tires, while it is true that most of the pit stops featured numerous tire changes (some well ahead of expectations), the absolutely unprecedented race speeds certainly will rationalize any questions which might be asked. Perhaps it is too early to draw comparisons but one point of interest regarding tire life is that the (*Turn to p.* 170)

1952 Indianapolis Race Story

RECAPITULATION

Car No.	Car Name	Driver	Qualifying Speed	Engine	Laps Completed	Cause of Elimination and/or No. of Pit Stops	Finishing Position and Average Speed
1	28 Cummins Diesel Spl.	Freddie Agabashian	138.010	Diesel (s) Own-6 cyl-401*	71	Dirt-clogged air inlet 1	
	9 Miracle Power Spl.	Andy Linden	137.002	MD4-183 (s)	20	Excessive loss of oil—3	
	4 Hinkle Spl.	Jack McGrath	136.644	MD4-270	200	Throttle shaft sticking	(11) 121.426
2	36 Novi Pure Oil Spl.	Duke Nalon	136.188	Own V8-183 (s)	94	Supercharger failure—3	
	18 Bardahl Spl.	Sam Hanks	135.735	MD4-270	200	4	(3) 128.880
	1 Belanger Spl.	Duane Carter	135.522	MD4-270	200	1	(4) 125.259
3	98 Agajanian Spl.	Troy Ruttman	135.364	MD4-270	200	2	(1) 128.992
	26 Fuel Injection Spl.	Bill Vukovich	138.212	MD4-270	191	Hit wall—2	
	22 Sarafoff Spl.	Cliff Griffith	136.617	MD4-270	200	2	(9) 122.402
4	59 Grancer Wynn Spl.	Jim Rathman	136.343	MD4-270	200	3	(2) 129.723
	16 Springfield Welding Spl.	Chuck Stevenson	136.142	MD4-270	187	Fuel system—2	Flagged
	2 Blue Crown Spl.	Henry Banks	135.962	MD4-270	184	Seized king pin—4	Running at fin. flagged
5	65 Leitenberger Spl.	Geo. Fender	135.947	MD4-270	197	Broken brake handle—2	Run. at fin. flagged
	54 Federal Engrg. Spl.	Geo. Connor	135.609	MD4-270	200	3	(8) 122.995
	7 Chapman Spl.	Bill Schindler	134.998	MD4-270	200	2	(14) 119.280
6	14 Bardahl Spl.	Joe James	134.953	MD4-270	200	Low on oil—2	(13) 120.183
	55 Aneted Rotary Engrg. Spl.	Bobby Ball	134.725	MD4-270	34	Broken transfer gear case	
	67 Mel Rae Spl.	Gene Hartley	134.343	MD4-270	65	Broken king pin bushing	
7	12 Grant Piston Ring (Ferrari) Spl.	Alberto Ascari	134.308	Own-12-268	40	Spin-caused by wheel failure	
	33 Bowes Seal Fast Spl.	Art Cross	134.288	MD4-270	200	2	(5) 124.292
	77 Peter Schmidt Spl.	Jimmy Bryan	134.141	MD4-270	200	4	(6) 123.814
8	34 Federal Engrg. Spl.	Roger Ward	134.139	MD4-270	130	Out of oil-leaking plug	
	37 John Zink Spl.	Jimmy Reece	133.993	MD4-270	200	2	(7) 123.312
	81 Central Excavating Spl.	Eddie Johnson	133.973	MD4-270	193	Ignition	Running at fin. flagged
9	93 Morris Spl.	Bob Scott	133.953	MD4-270	49	Broken drive shaft	
	29 Bob Estes Spl.	Jim Rigsby	133.904	MD4-270	200	Broken brake support—3	(12) 120.587
	21 Novi Pure Oil Spl.*	Chet Miller	139.034	Own V8-183 (s)	41	Supercharger failure—2	
10	8 Coast Grain Spl.	Manuel Ayulo	135.982	MD4-270	184	Fuel system	Running at fin. flagged
	48 Granatelli Enterprise Spl.	Spider Webb	135.902	MD4-270	182	Overheating	
	27 Blue Crown Spl.*	Tony Bettenhausen	135.384	MD4-270	93	Starter failure	
11	5 Jim Robbins Spl.	Johnny Parsons	135.328	MD4-270	200	3	(10) 121.799
	73 McNamara Spl.	Bob Sweikert	134.983	MD4-270	77	Broken rear axle gears	
	31 McDowell Spl.	Johnny McDowell	133.939	MD4-270	182	Fuel system	Running at fin. flagged

NOTE: In "Engine" Column (s) equals Supercharged. Also displacements given are nominal only—where "270" is used the engine may be down to "260" or up to 273 depending on bore and stroke actually built into the job. "270" thus really refers to a type rather than specific size.

*—Front Drive (Results and averages obtained from official sources—R. T. J.)

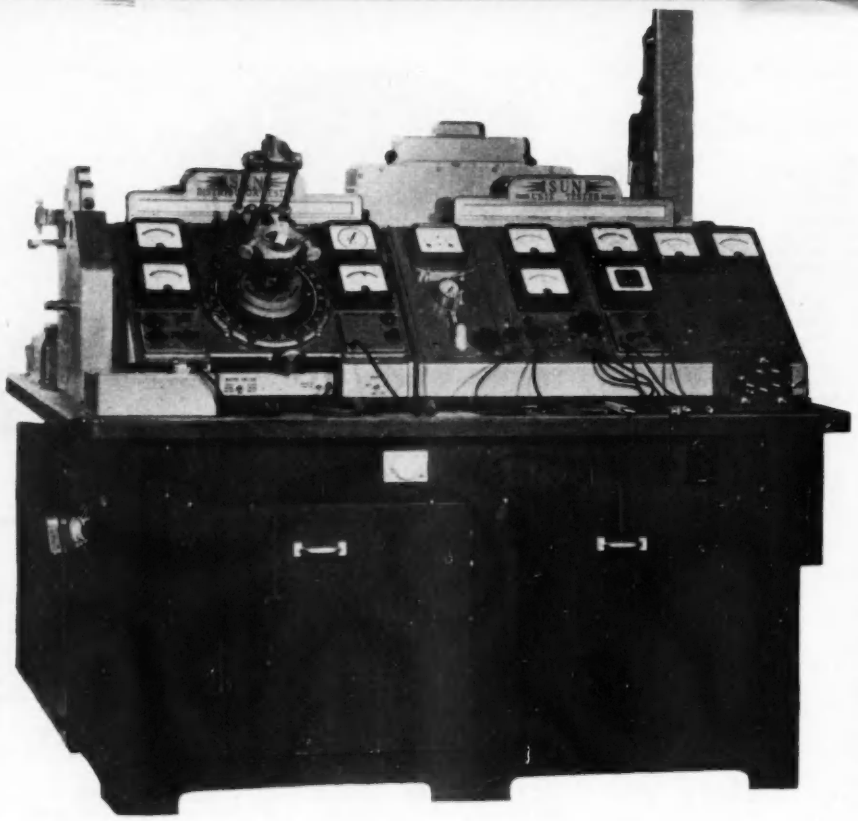


Fig. 1—This is a front view of the complete electrical test stand supplied to Ford Motor Co. for checking various electrical elements and other accessories before installation at the factory branches. It may be noted that other instrumentation and equipment is found on the rear side as well.

Testing Electrical Units With Self-Contained Diagnostic Equipment

SEVERAL years ago the Sun Electric Corp., Chicago, Ill., embarked on an extensive educational and promotional program designed to assist dealers and service organizations in doing a better job of servicing motor cars and trucks through scientific diagnosis. Sun Electric test stands have become familiar all over the country, and not only have they produced owner satisfaction on engine tune-up operations but they have been instrumental in the improvement of service intake and profits for dealers.

At the same time, the company gained acceptance for scientific instrumentation at the factories. Fruition of this activity is the recent adoption of electrical test stands of special design by Ford Motor Co. Made to Ford specifications, these special test stands are for installation in Ford assembly branches.

The test stands are being employed for the testing of all electrical equipment and certain other accessories for Ford car and truck engines, before these parts are OKed for installation. In this role, the electrical test stand makes it possible to reject defective or off-standard units before assembly in the vehicle. This screening process has other important advantages. For one thing, it relieves the dealer of the costly job of trouble-shooting and replacement of defective elements. And from the standpoint of the factory, it reduces, if not entirely eliminates, the returns of defective parts from dealers.

At the same time this procedure provides an excellent check on quality control on the part of suppliers. An incidence of rejections at the source will alert the

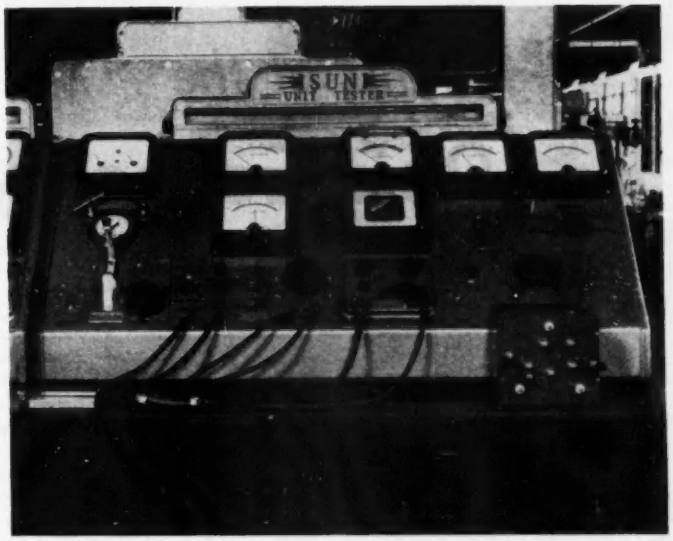


Fig. 2—Close-up of the Sun unit tester which is located at the right on the test stand shown in Fig. 1. This unit, described in the text, is used for inspecting generator regulators.

supplier and impel him to investigate his own manufacturing and testing facilities to assure conformity to purchase specifications.

On the other hand, the use of scientific diagnostic equipment on the part of dealers and service stations should go far to screen good parts from bad and reduce the return of critical parts such as batteries, for example, by isolating the real causes for complaint. Thus the incidence of returns from dealers should be further reduced and, consequently, eliminate a troublesome problem for the factory to handle

Electrical test stands supplied to Ford are self-contained cabinets, as illustrated, and are suitably equipped to check the following functions:

1. Generator regulator
2. Ignition coil
3. Fuel level indicator
4. Oil pressure indicator
5. Temperature indicator
6. Charge indicator
7. Oil pressure gage, engine unit
8. Distributor tests, all phases
9. Fuel gage, tank unit
10. Generator
11. Starting motor and drive assembly
12. Heat indicator bulbs
13. Thermostats for opening and closing temperatures
14. Generator and starting motor armatures
15. Thermostat leakage

Details of some of the testing devices included in this equipment are noted briefly below:

The panel on the right contains a d-c ammeter and voltmeter for recording the results of tests of the generator regulator. After the regulator has been heated, it is placed on the contacts of the box-like fixture in front of the panel and held in place by two spring-loaded handles. The bottom of the regulator makes electrical connections with the spring loaded contacts shown in Fig. 2. Current passes through the regulator windings and points as if wires were attached to its terminals. A selector switch and field variable resistance knob make possible all regular tests—closing and opening of the cut-out points, voltage and current regulator settings.

The next panel (second from right in Fig. 2) is used in testing the ignition coil for capacity, open, shorted and grounded coil windings. Coil capacity, which reflects opens, shorts and grounds, is indicated in either the "good" or "bad" bands on the meter scale. The resistance of the secondary winding, including its connection to the secondary

(*Turn to page 92, please*)

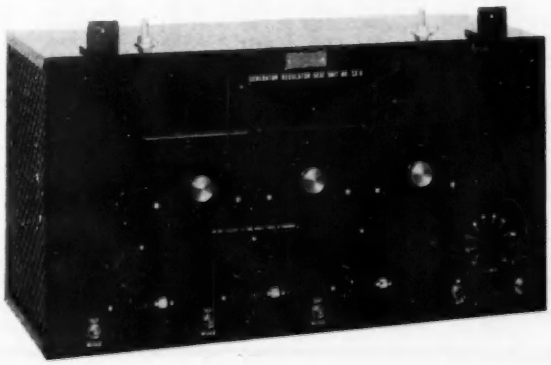


Fig. 3—The generator regulator heater, for heating regulators to operating temperature before testing, is one of the units mounted on the rear side of the test stand shown in Fig. 1. In the center may be seen the three trays mentioned in the text.

Highlights of the
1952 Economy Run

1952 Economy Run Data

Average weight, all cars	3809.40
Oil consumption total of all cars	44 pints
Most oil consumed by one car	6 pints
Most gasoline consumed by one car	87.1755 gal
Least gasoline consumed by one car	45.8714 gal
Cars adding water	5 cars
Highest ton mpg	59.7118
Lowest ton mpg	40.8065
Highest mpg	30.8556
Lowest mpg	16.2362
Over-all mpg average of all cars	22.0057
Average gasoline consumed by all cars	66.1326 gal
Average speed	40.846

THIS year's Mobilgas Economy Run was over a much longer course than last year from Los Angeles to Sun Valley, Idaho—1415 miles versus 840 miles. The course included a wide variety of conditions, varying from 70 ft below sea level with desert temperatures, to over 8000 ft with sub-freezing temperatures. During the Run the cars climbed to over 6000 ft twelve times.

The first day's run of 515.5 miles, terminating at the Grand Canyon, via Palm Springs and Blythe, Calif., Prescott and Williams, Ariz., had to be completed in 12 hours, 53 minutes. The first car left Los Angeles at 3:00 A.M., April 14, and the others started at two minute intervals until all 26 cars got under way. The next day's run of 575.3 miles went from

Final Results—1952

Price Division F.O.B. Factory	MAKE	Type	Type of Mobilgas	WEIGHT		Axle Ratio	Type of Drive
				Car	Total		
A $1600 to $1950	Studebaker Champion	4 Dr.	Regular	3020	3770	4.55:1	Overdrive
	Chevrolet Styleline	4 Dr.	Regular	3420	4170	4.11:1	Standard
	Ford Mainline "6"	4 Dr.	Special	3480	4230	4.10:1	Overdrive
	Ford Mainline "8"	4 Dr.	Special	3600	4350	4.10:1	Overdrive
	Plymouth Cranbrook	4 Dr.	Special	3420	4170	4.30:1	Overdrive
B $1951 to $2225	Studebaker Commander	4 Dr.	Regular	3390	4140	4.55:1	Overdrive
	Kaiser De Luxe	4 Dr.	Special	3600	4350	4.55:1	Overdrive
C $2226 to $2350	Mercury Monterey	4 Dr.	Special	3950	4700	4.10:1	Overdrive
	Studebaker Land Cruiser	4 Dr.	Regular	3470	4220	4.55:1	Overdrive
D $2351 to $2500	Chrysler Windsor	4 Dr.	Special	4000	4750	3.90:1	Standard
	Hudson Wasp	4 Dr.	Regular	3920	4670	4.55:1	Overdrive
E $2501 to $2900	Packard "200"	4 Dr.	Special	3930	4680	4.10:1	Overdrive
	Hudson Hornet "6"	4 Dr.	Regular	4040	4790	4.10:1	Overdrive
	Hudson Commodore "8"	4 Dr.	Regular	4040	4790	4.55:1	Overdrive
	De Soto Firedome 6 Pass.	4 Dr.	Special	4395	5145	4.10:1	Overdrive
F $2901 to $3450	Chrysler Saratoga 6 Pass.	4 Dr.	Special	4420	5170	3.54:1	Fluid-Matic
	Packard "300"	4 Dr.	Special	4220	4970	3.54:1	Ultramatic
G $3451 to $3750	Lincoln Capri	4 Dr.	Special	4520	5270	3.07:1	Hydra-Matic
	Chrysler Imperial	4 Dr.	Special	4720	5470	3.54:1	Fluid-Matic
H $3751 to $4500	Packard "400"	4 Dr.	Special	4340	5090	3.54:1	Ultramatic
	Chrysler Saratoga 8 Pass.	4 Dr.	Special	4980	5730	3.54:1	Fluid-Matic
I $4501 to $7000	Chrysler Crown Imperial	4 Dr.	Special	5800	6550	3.54:1	Fluid-Torque
Special Lightweight 4-Cylinder Class	Henry J Corsair "4"	2 Dr.	Special	2580	3330	4.55:1	Overdrive
Special Lightweight	Henry J Corsair "6"	2 Dr.	Special	2655	3405	4.55:1	Overdrive
6-Cylinder Class	Plymouth Concord	2 Dr.	Special	3325	4075	4.10:1	Overdrive

By Wilmot Sandham
Automotive Engineer
General Petroleum Corp.

Grand Canyon via Marble Canyon, Painted Desert, Zion National Park, Beaver and Provo to Salt Lake City and had to be completed in a maximum of 14 hours, 0 minutes. The third day's run of 324.6 miles from Salt Lake City to Sun Valley, via Burley and Twin Falls, Idaho, had to be completed in a maximum of eight hours, seven minutes.

Total elapsed time could not exceed 35.0 hours, necessitating an overall average speed of almost 40½ mph. Considering that all speed limits had to be strictly observed including the many city and town regulations of 25 mph, and in Idaho 20 mph, a consistent open highway speed of near the maximum legal speed limit had to be maintained.

The route selected this year also included much more heavily traveled highways which made a high average speed more difficult to maintain.

The Mercury Monterey entered by Bob Estes and driven by Bill Strope won the Sweepstake award by securing 59.7118 ton mpg with 25.4093 mpg average. The Lincoln Capri entered by Deaton Motor Co. and driven by Art Rene was second high with 58.9085 ton mpg with 22.3562 mpg. The De Soto Firedome 8 was next with 54.7368 ton mpg and 21.2777 mpg. It is interesting to note that of the 12 cars exceeding 50 ton mpg, all but four of them were of the new type engines with overhead valves and all of these overhead valve engines were V-8's with the exception of the Ford 6.

It is also interesting to note the second highest performance was secured by the Lincoln valve-in-head engine using a dual range Hydra-Matic transmission. Engineers have long expected the overdrive equipped cars to prove more economical, but new automatic transmissions seem to be offering a challenge. Only two cars had standard three-speed transmissions and both showed the lowest ton mpg and mpg in their respective classes. Seven had automatic transmissions of one type or

(*Turn to page 90, please*)

Mobilgas Economy Run

Number of Cylinders	Make of Carburetor	Ton Miles	Miles Per Gallon	FINAL CLASS AVERAGE		SWEEPSTAKES AVERAGE	
				Ton Miles Per Gallon	Place	Ton Miles Per Gallon	Place
6	Carter	2668.029	27.8220	52.4444	2		
6	Rochester	2951.109	20.5714	42.8915	5		
6	Holley	2993.571	25.4634	53.8551	1	53.8551	4
V8	Holley	3078.495	22.1492	48.1744	4		
6	Carter	2951.109	23.5220	49.0433	3		
V8	Stromberg	2929.878	25.5968	52.9854	2		
6	Carter	3078.495	24.6480	53.6094	1	53.6094	5
V8	Holley	3326.190	25.4093	59.7118	1	59.7118	1
V8	Stromberg	2986.494	25.3832	53.5586	2		
6	Carter	3361.575	19.3599	45.9798	2		
6	Carter	3304.959	20.4638	47.7830	1		
8	Carter	3312.036	19.2278	44.9930	4		
6	Carter	3389.883	20.8274	49.8816	2		
8	Carter	3389.883	20.3973	48.8516	3		
V8	Carter	3641.1165	21.2777	54.7368	1	54.7368	3
V8	Carter	3658.809	19.0237	49.1762	1		
8	Carter	3517.269	16.4211	40.8065	2		
V8	Holley	3729.579	22.3562	58.9085	1	58.9085	2
V8	Carter	3871.119	19.0802	52.1844	2		
8	Carter	3602.193	16.9509	43.1400	2		
V8	Carter	4055.121	17.6520	50.5729	1		
V8	Carter	4635.435	16.2362	53.1736	1		
4	Carter	2356.641	30.8558	51.3749	1		
6	Carter	2409.7185	26.3676	44.8903	2		
6	Carter	2883.8775	23.0797	47.0250	1		

LINCOLN ENGINES Built and Tested on Carriers of Special

From start to finish the Lincoln engine travels on the power-and-free conveyor system mounted on the special carrier seen in this view. At this particular station operators are installing spark plug wires and heat shields.

ASSEMBLY of Lincoln V-8 engines from the start of the operation, through painting, hot test, and delivery to the shipping station has been organized by automation in a continuous and uninterrupted sequence at the Lincoln plant in Dearborn, Mich. This has been accomplished by means of a power-and-free conveyor system stemming from studies by engineers and the production staff of Ford Motor Co. in cooperation with Jervis B. Webb Co. A basic feature of the setup is a carrier of special design to which the cylinder block is attached immediately after machining, forming the backbone for building the engine. What is particularly significant is that an engine remains on the same carrier from the start of the line until it is removed at the shipping dock.

The complete automation system consists of seven independent conveyor lines, individually operated and interconnected by free track, as shown in the accompanying table.

In regular operation, assembly begins with the loading of a cylinder block on a carrier on the assembly conveyor, carriers being lowered to this station by means of the holdback conveyor. The free trolley with a loaded carrier is run free of the gravity conveyors, then released into the power assembly line. It may be noted that the design of the carrier is such as to allow an engine to be rotated and held in a fixed position on its vertical axis in any of eight positions. In addition, it can be locked in a horizontal position at any point in 360 deg by means of a self-locking worm gear box.

Progressive assembly of elements continues to the end of the first conveyor section where engines are transferred automatically to the paint conveyor. If adjustments are necessary before painting, the individual carriers are diverted to a repair free track loop, then fed back to the paint conveyor automatically.

By Joseph Geschelin

Design

General Specifications of Conveyor Lines

Description	Speed (fpm)	Length (ft)
Assembly conveyor	3 to 12	165
Assembly and paint	3 to 12	460
Hot test delivery	6.5 to 26	380
Repair delivery	6.5 to 26	280
Balancer delivery	6.5 to 26	410
Lift delivery and carrier return	6.5 to 26	1240
Shipping rack lift	75	27
Power rack unit lift	75	60
Hold back conveyor	59	22

On the paint conveyor, engines traverse the paint spray booth and drying oven, then loop back to the assembly line for further assembly operations. Engines requiring touch-up are diverted to a nearby loop used for this purpose, then returned to the assembly conveyor.

The assembly line continues to a transfer point where the carriers are released by quick drop on a free section of track and fed automatically into the hot test delivery conveyor. The hot test conveyor is a complete recirculating loop, controlled by 24, two-way switches, equipped with an automatic air stop and feeder ahead of the test stands, and an automatic air stop and feeder after the test stands. However, a hand stop is provided between these feeders to correctly position an engine for testing.

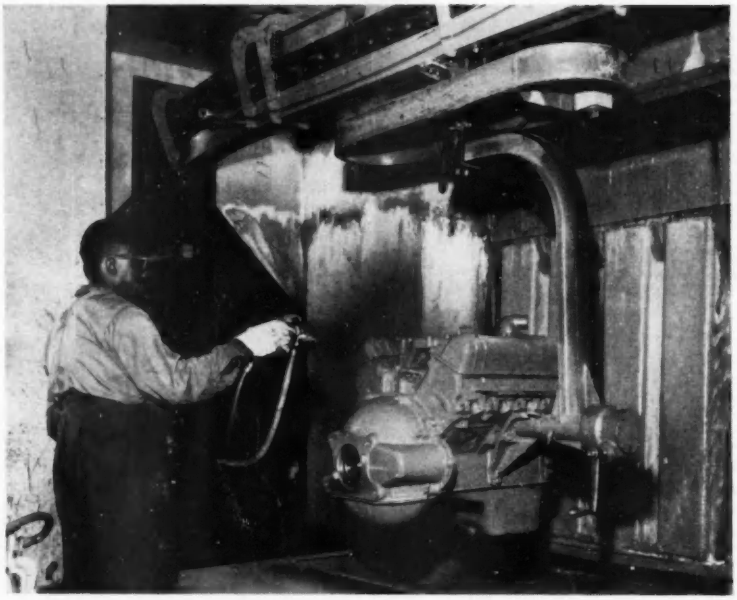
Scheduling of engines onto test stands has been organized entirely by automation. As an engine is released from the hand stop, mentioned above, it moves by gravity against an air-operated feeder and remains at this point until an open space presents itself on the pick-up and delivery conveyor. When an engine enters this conveyor section it automatically releases a waiting engine into position above an open test stand and into the hand stop. The pick-up and delivery conveyor too is a closed loop, designed to recirculate engines that do not enter repair spur lines It also delivers OK'ed engines from the spur track into the balancer delivery conveyor. This conveyor is equipped with 11, three-way and seven, two-way automatic switches for taking engines from the two banks of test stands for shipping, balance, or other reasons.

The lift delivery and carrier return conveyor system receives all engines from the OK free spur track and balancing free spur track; and also serves as a return line for empty carriers. It receives these engines for shipment from balancing OK and dress-up lines and delivers them to the lifts, the latter being manually controlled from the first floor, although automatic in operation.

Central control is provided for each conveyor line in the system, comprising the following elements:

1. Start-stop push-button
2. Speed indicator calibrated in fpm, and a speed change switch
3. A signal light system to show:

General view of block testing in "hot" test department. Engines are routed to the test block while suspended from the carrier and held on the free spur during the test schedule.



Engine assemblies are painted, as shown, while traveling on the conveyor line.

conveyor running
control "not ready"
conveyor stopped by
manual control
conveyor stopped by
"lock-out"

Following are some of the major features of the test stands. They are self-contained and designed to function on an automatically controlled cycle of 20 minutes' duration. At the end of the cycle, the engine is automatically shut down by a timer.

When an engine is centered over a test block, as described earlier, the operator makes up a series of connections for water, drains, oil, fuel, etc. Then he turns on the air pressure which locks all water connections. This is followed by turning the timer control knob to "start" position. The selector switch then moves automatically to position 1, permitting flow of water, oil, and fuel to the engine.

The operator then starts the engine. After going automatically through the "start" and "flush" cycle, the control moves to the "run" zone with the engine running while the operator makes adjustments and inspection. Later the timer reaches the "stop" zone and at that point the fuel pump stops, line vents and drains, pressure in the oil metering cylinder is released, and the engine stops.

Finally the timer reaches the "off" position, at which stage the water supply is shut off and all connections removed by the operator.

As mentioned above, the entire cycle is timed automatically for a predetermined interval. However, the operator can advance or retard the cycle manually to compensate for adjustments in any portion of the cycle.

• • •

Government Lifts Controls on Purchase of Copper

Mobilization officials recently chose what seemed to be the lesser of two evils by lifting controls from copper bought on the world market rather than submit to demands for a long-term, fixed high-price contract.

Effects of Lifting

This Government action permits manufacturers of copper wire mill and brass mill products to buy all the foreign copper they can get—within limits of the monthly 130,000 tons alotted by the International Materials Conference to the U. S. from free world supplies. It also permits them to pay whatever is necessary, either the going world price or the best bargain they can drive, for such purchases from Chile and other foreign sources.

Likewise, "comparable" treatment will be extended to other primary users of refined foreign copper, including copper produced in this country from foreign ores and concentrates. Purchasers of foreign copper, however must absorb 20 per cent of any increase they are forced to pay over and above the previously permitted ceiling of 27½ cents per lb. They are permitted to pass on only 80 per cent of the additional cost.

Price Complications

The basic actions do not apply to domestically produced copper. Officials say no increase is being considered in the domestic ceiling of 24½ cents per lb, and they are bracing themselves for a barrage of objections.

Therefore, increases in ceilings for copper products will call for complicated figuring, since they necessarily must be based on the amount of foreign copper used compared to domestic. Increases become effective June 16.

Stockpile Bite

Another recent Government action on copper was the White House authorization for release of 22,000 tons of copper from the strategic stockpile. This was to make up the shortage caused by stoppage of Chilean copper shipments on May 8.

Mobilization officials said, however, that the full amount authorized probably would not be released at one time. It was planned to let it loose in small lots in hope that imports would resume to an extent that it would not be necessary to use up the full 22,000 tons.

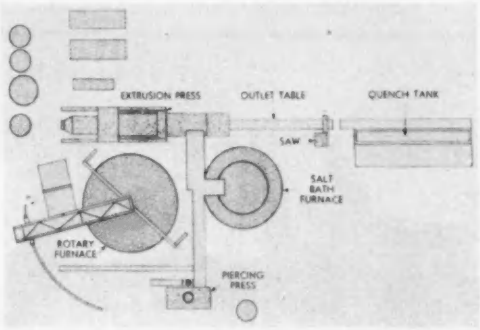
News of the MACHINERY INDUSTRIES

By Thomas Mac New

Details Are Revealed of the Hot Extrusion Process That Utilizes Glass as a Lubricant.

Extrusion Process Disclosed

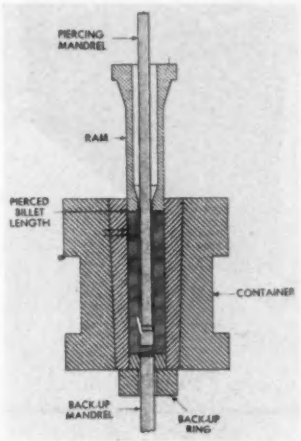
Just a short time ago the Babcock & Wilcox Co. started to use a hot extrusion method for the production of tubular and solid shapes, and last month the company decided to disclose the details. The process makes use of an American made extrusion press that is said to take full advantage of the French Ugine-Sejournet hot extrusion method. In a relatively short time, the B&W Beaver Falls, Pa., plant has extruded Croloys—stainless steels — pure molybdenum and pure titanium successfully. Noteworthy also was the extrusion of a tube from a round cornered square continuous cast billet, wherein a finished tube was produced from molten steel in just three operations. The Ugine-Sejournet process uses glass as a lubricant — a development of Comptoir Industriel d'Etirage et Profilage de Metaux which makes the method economically feasible.



Arrangement of the Babcock & Wilcox plant for the hot extrusion of tubular solid shapes.

Method and Equipment

In production, billets are charged into a rotary-hearth, gas-fired furnace. After heating, if they are to be made into tubing, they are rolled across a glass-pickup table to a piercer charging device. Billets for solid extrusions omit the piercing operation. B&W makes use of a separate 500 ton vertical press for piercing to produce the hollow billets. This equipment produces a slightly oversize hole in the billet to allow the use of a larger, and consequently stiffer mandrel. Therefore, there is less mandrel wander at the far end of the pierced billet, and better concentricity is achieved. The piercing is done with glass interposed between billet and piercing mandrel and, depending on analysis, either with or without glass between the container and the billet. The piercing operation consists of pre-compression, piercing to within an inch of the cylinder bottom which is closed by a back-up mandrel, and finally completing the pierce when the back-up mandrel retreats.



The piercing operation consists of pre-compression, piercing to within an inch of the cylinder-bottom which is closed by a back-up mandrel, as shown above, and finally completing the pierce when the back-up mandrel retracts.

Pierced or unpierced billets are charged into metal baskets which support them in a rotary salt bath furnace. After circling through the furnace, the basket is lifted out and the billet is discharged into a trough on a transfer car. The car has an inclined surface containing a glass fiber mat. As the car travels toward the 2500 ton extrusion press, the billet is raised out of the trough and rolled down the inclined plane fusing to the glass mat and picking it up. When the transfer car reaches the end of its travel, the billet has rolled into a trough at the front end. This trough lines up with the container bore in the extrusion press, and the billet is automatically pushed into the container.

A glass sock is placed over the mandrel and a glass cartridge placed against the die. Thus with the mandrel, die and container lubricated with glass, metal to metal seizure is prevented on all surfaces.

The actual extrusion takes from two to four sec, yielding a piece from 20 to 60 ft long depending on the size of the billet and the area of extruded section.

Some interesting features of the extrusion press are its ability to handle up to eight-in. billets, a stroke of 100-in., a prefill sped of 21 ips and a possible power stroke speed of six ips. The press operates on 3600 psi water supplied from two air-water accumulators.

Motor Maker Opens New Plant

To broaden the scope of its facilities for the design, development and manufacture of electric motors and allied equipment, Reliance Electric &

(*Turn to page* 152, *please*)

EQUIPMENT PLANT • PRODUCTION

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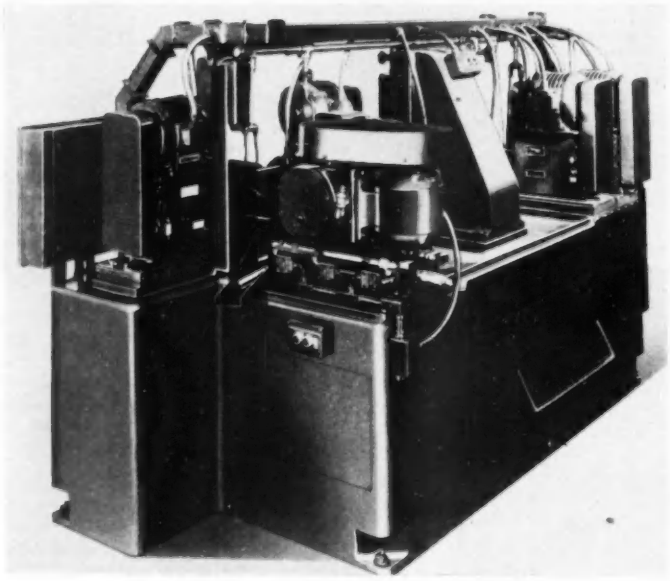
Progressive In-Line Transfer Machine



Motch & Merryweather automatic in-line transfer machine.

Recently placed on the market is an automatic transfer machine of the progressive in-line type. It machines, cuts off to accurate length and finally chamfers both ends of the cut-off pieces.

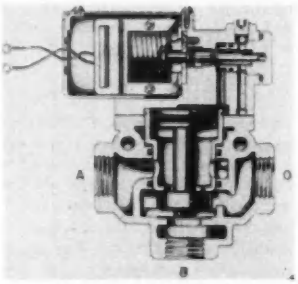
Solid cold drawn stock is fed hydraulically to the first station, which drills from both sides. The second operation is a countersink of the drilled hole. Third and fourth stations broach flats on both sides of the stock. Fifth station cuts off where a circular saw head rapid traverse approaches, cuts to accurate length a section of the machined stock held by a transfer unit, and rapid traverse returns. The hydraulic transfer unit, holding the machined and cut-off piece, returns to position on the side where two drilling units feed to adjustable stops, chamfer both ends of the piece simultaneously, and rapid traverse returns. The hydraulic transfer unit returns to the in-line position of the bar stock, ejects the completed piece to a chute and receives the next section of bar stock to be cut off. This machine handles 300 differential pinion shafts per hour at 100 per cent efficiency. *The Motch & Merryweather Machinery Co.*

Circle E-1 on page 65 for more data

Solenoid Operated Air Control Valve

A special feature of a P-M line of Pilot-Master valves, recently announced is a three-way solenoid valve so designed that it "fails safe" under all conditions. Its principal use is expected to be for the control of clutch and brake cylinders on mechanical presses.

Called the Series B-3, the valve is said to be a completely springless assembly in which both pilot and master valves are automatically returned to the normal or inoperative position by air pressure the instant the solenoid is de-energized.



Hannifin solenoid air control valve, Series B-3.

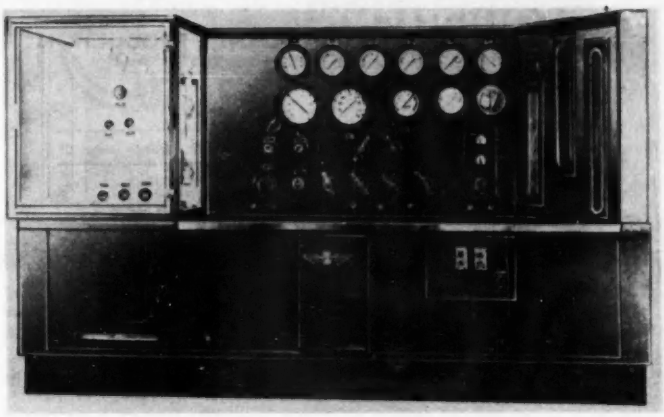
The master valve can be operated either two-way or three-way, normally closed to pressure or normally open. Recommended pressure range is from 40 to 125 psi in order to keep differential pressure on the pilot valve stem within the design range. One size of pilot head fits all five sizes of master valves from ⅜-in. through 1¼-in. I.P.S. *Hannifin Corp.*

Circle E-2 on page 65 for more data

Stand for Testing Pneumatic Components

A pneumatic test stand recently brought out is composed of either a booster cylinder, or an air compressor with electric motor, muffler and automatic pressure regulators. Supplying the air pressure are several circuits, including the static air circuit for maximum pressure up to 6000 psi, the vacuum circuit with two-stage nine cfm capacity vacuum pump capable of producing 0.001 mm hg and a vacuum chamber, capacity of 700 cu in. The maximum flow conditions are 300 cfm at 5000 psi using a booster cylinder.

The test stand also includes an after cooler assembly and moisture eliminator. The circuit is such that clean cool air is available at the pressure outlet connections. A receiver tank is supplied to give a steady flow of compressed air. A pressure system containing a suitable air reducing valve is installed with gage and outlet connections, so that control of pressure up to 6000 psi is available. If provided with a compressor, this unit is capable of developing pressures under constant operating conditions up to 6000 psi. A compound pressure and vacuum gage and a manometer are mounted on the instrument panel indicating vacuum or positive pressure and flow. A calibration chart is also provided. Electrical equipment is suitable for operation on 220/440 v. As extra equipment, a 24 v d-c power source can also be furnished. *Greer Hydraulics, Inc.*



Greer pneumatic test stand.

Circle E-3 on page 65 for more data

Totally-Enclosed Dual-Cooled Motor

In many instances, especially where a drive motor must be protected from bad atmospheric conditions, the unit must be enclosed; and, when enclosed, must be properly cooled within itself, preferably by clean air.

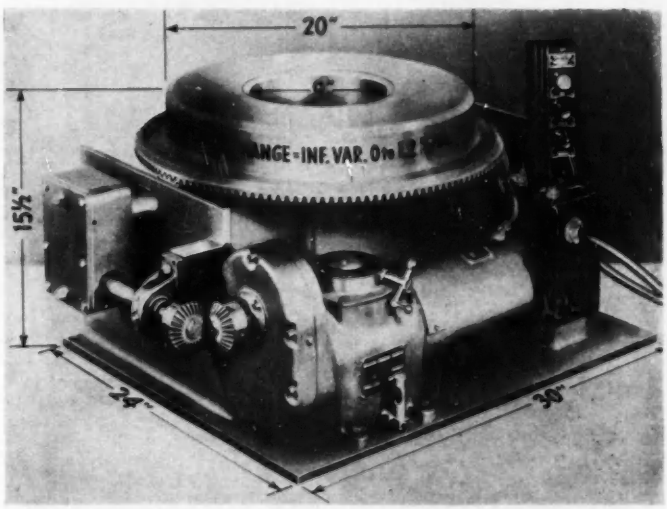
To meet this type of service, a unit has been developed which may be termed a totally-enclosed, dual cooled motor, equipped with a heat exchanger as an integral part of its own frame. A 1½ hp, three phase, 60 cycle motor, built into the heat exchanger, runs at 3600 rpm to drive internal and external fans independently of the main motor itself.

The heat exchanger sections are cast aluminum with both internal and external fins for maximum heat dissipation. Air velocity through the internal sections of the exchanger is 2900 fpm. In the external path between the cover and the exchanger bank the air is pumped at 3300 fpm.

The dual-cooled design, it is said enables the maker to build motors in all sizes up to 150 hp with Underwriters and Bureau of Mines approval. *Reliance Electric & Engineer-Co.*

Circle E-4 on page 65 for more data

Large-Hole Turntable



New on the market is a large-hole turntable, Model X-20115, which was designed for the purpose of mounting on a bench, the floor or a pit to rotate heavy, large diameters on the horizontal plane. With the nine-in. hole in the center of the turntable, spindle shafts can be positioned without special fixtures. Infinitely variable speeds of the work table from zero to 1.2 rpm are said to handle a wide range of work. A remote push-button control and magnetic reversing starter are standard equipment. (Aronson Machine Co.)

Circle E-5 on page 65 for more data

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NEW EQUIPMENT PLANT • PRODUCTION

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(*Continued from page 57*)

Drilling and Tapping Machines

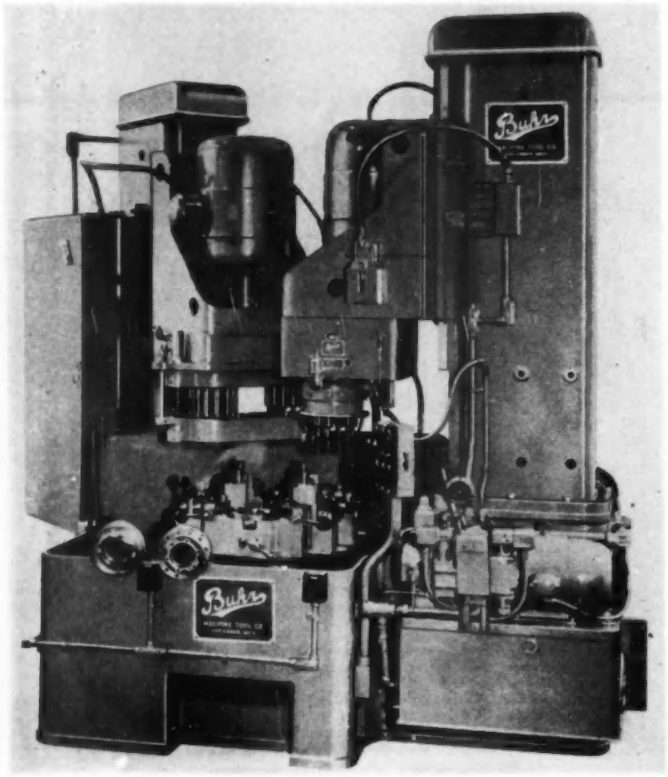
A feature of a special drilling and tapping machine that has been produced is that it can be easily converted to other uses after it has completed its present job of processing Army tank parts. Special feature of this machine is that both sides of the part are drilled and tapped in the same fixture, an operation which is accomplished by turning the part over after one side has been drilled and tapped.

Two sets of locators are produced, with a single lever actuating both sets, lowering one set as it raises the other set into working position.

This unit is a two-column combination machine which drills, chamfers and taps (12) 9/16-18 holes in each end of the tank part.

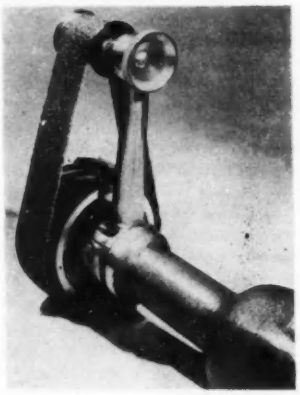
Tooling consists of a 24-spindle drill head and a 12-spindle individual lead screw tapping head and one four-station fixture. *Buhr Machine Tool Co.*

Circle E-6 on page 65 for more data



Buhr special drilling and tapping machine.

Belt Grinder for Portable Tools



Carborundum belt grinding attachment.

Now available for portable grinding is an attachment which permits the use of abrasive belts on straight spindle air and electric portable tools. This grinding attachment is made from light weight aluminum castings, consists of an idler pulley, the supporting mechanism, and a contact wheel; the latter being mounted on the tool spindle. The unit is attached by a split bracket to the casing of the tool where grinding wheel guards are normally mounted.

Two models are now available. Speeds from 5000 to 10,000 sfpm are recommended for efficient belt usage wherever possible. Initial belt sizes for these two models are 12 in. by one in. and 20 in. by two in. A wide variety of grit sizes and backings may be used. *Carborundum Co.*

Circle E-7 on page 65 for more data

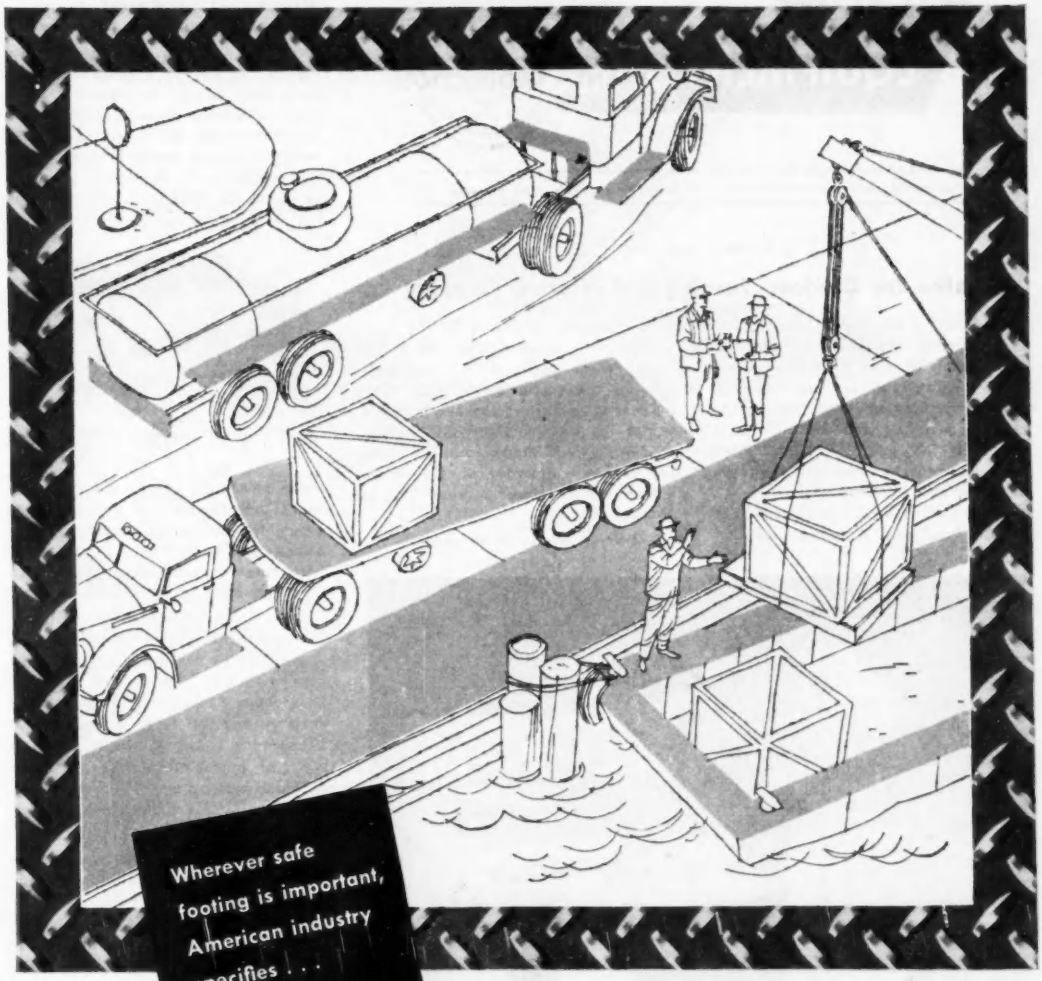
Non-Ferrous Tube Mills

A machine has been developed for producing electrically welded tubing of the principal non-ferrous metals. These include practically all aluminum alloys available in coiled sheet form, copper alloys, various brasses, nickel, monel and inconel.

At present three sizes of mills are being offered which have a total capacity range of ¾-in. to eight-in. diam, on metal thicknesses ranging from 0.025 in. up to 0.140 in. Welding speeds of 50 to 90 fpm are practical. *Yoder Co.*

Circle E-8 on page 65 for more data

(*Turn to page 60, please*)



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The long-lasting qualities of Inland 4-Way Safety Plate means lower maintenance and replacement costs —fewer repairs.

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(*Continued from page 58*)

Lathe for Contour Turning and Internal Copying

The +GF+ copying lathe which has been recently brought out is said to be a completely new approach to contour turning and internal copying. Production economies are claimed to result from the following factors: simplicity of operation, low setup and changeover time, and reduced handling and checking time.

Chips are removed through the rear of the machine. Template location is on the front of the machine.

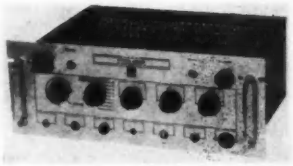
The entire hydraulic system is enclosed in the carriage. Contact pressure of the tracer against the template is very light. Copying range is said to be increased through the use of a duplex tool holder, and the copying tool is supported on the whole length of the shank. *New Britain Machine Co.*

Circle E-9 on page 65 for more data

New Britain copying lathe, Model +GF+

Universal Amplifier

Now available for delivery is a universal amplifier, carrier type, designed for use in a standard 19-in. rack and having a seven-in. front panel. Designated as Model BL-360, the instrument was designed for use with the Brush magnetic direct writing oscillographs in studies of static or dynamic strains up to 100 cps



Brush universal amplifier, Model BL-360.

when measured by the use of resistance sensitive strain gages. Pressures, temperatures, torque, accelerations and forces may be recorded with these instruments when sensed with the appropriate pickup device.

The Model BL-360 was designed for use with the SR-4 120 ohm strain gage but may be used with any gage type with ohmic resistance of 50 to 1000 ohms. Provision is made for operating one to four active gages. Measurable range of the instrument is 10 to 40,000 microinches per inch with one active gage. The sensitivity is increased four times by the use of four active gages.

The control panel contains a ten stop attenuator, terminals for connection of strain gages, calibration resistor holder, resistance and capacity bridge balance controls, gain controls and pen centering control. The amplifier contains a 2000 cycle bridge energizing oscillator, high gain a-c amplifier, phase sensitive discriminator and d-c output amplifier. Provision is made to permit the use of the d-c output amplifier section as a separate unit. An input jack is supplied for this purpose. *The Brush Development Co.*

Circle E-10 on page 65 for more data

Ball-Bearing Torque Tester

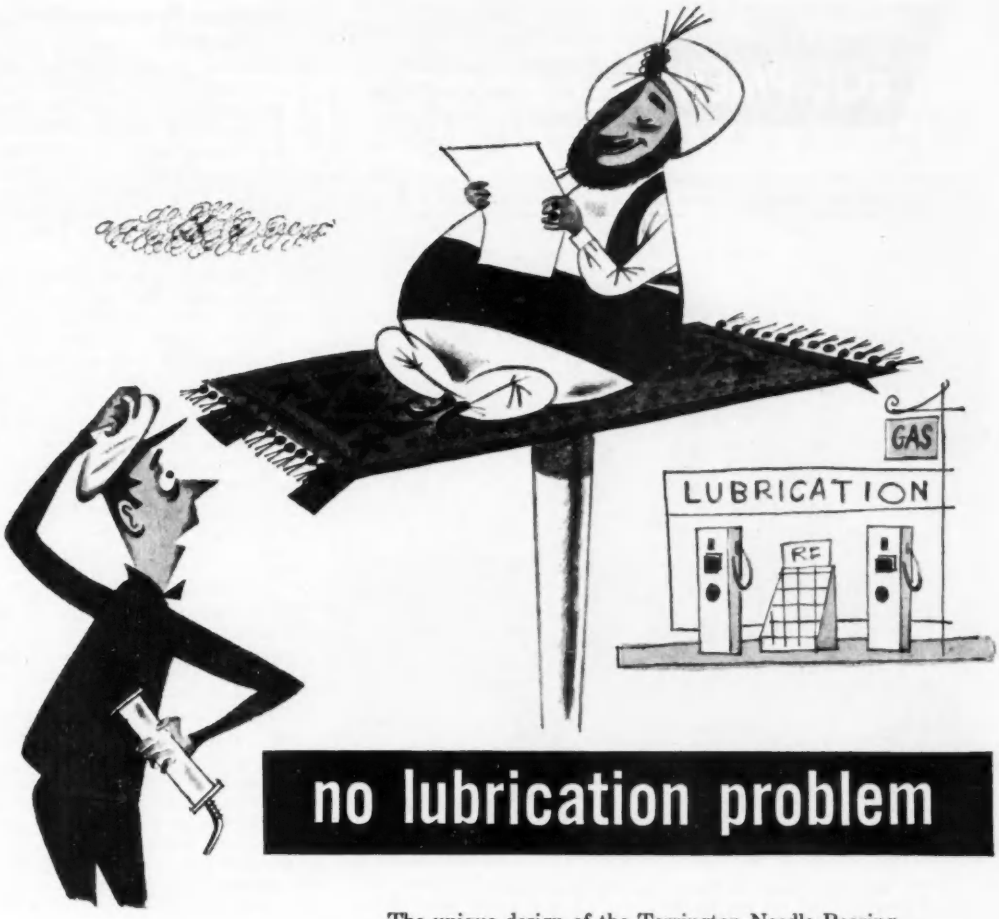
A device for measuring torque transmitted through small instrument ball-bearings under thrust loads has been developed. Designed to act as a quality control check in both production-line and laboratory work, the tester is able to show how the torque of a small ball-bearing varies as a function of angular position during a continuous slow rotation in either direction.

Basically, the equipment determines bearing torque by measuring the current drawn by a torque motor in counterbalancing the bearing race torque as indicated by an electromagnetic pick-up.

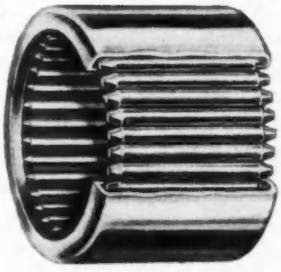
According to the company, the ball-bearing torque tester will make possible the detection of dirty or defective bearings before their installation in an instrument. Number and magnitude of peaks, average friction, and tendency to bind under load all can be determined. *General Electric Co.*

Circle E-11 on page 65 for more data

(*Turn to page 62, please*)



no lubrication problem



The unique design of the Torrington Needle Bearing minimizes lubrication problems. The turned-in lips of the outer shell retain a large reservoir of oil and grease. And the full complement of small diameter rollers carries a thin lubricating film to all bearing contact surfaces. In some applications, the original lubricant will last for the life of the product.

Have you considered this and other Needle Bearing advantages—such as high radial load capacity, light weight and compact size—in terms of *your* product? Torrington engineers will welcome the opportunity to give you full details.

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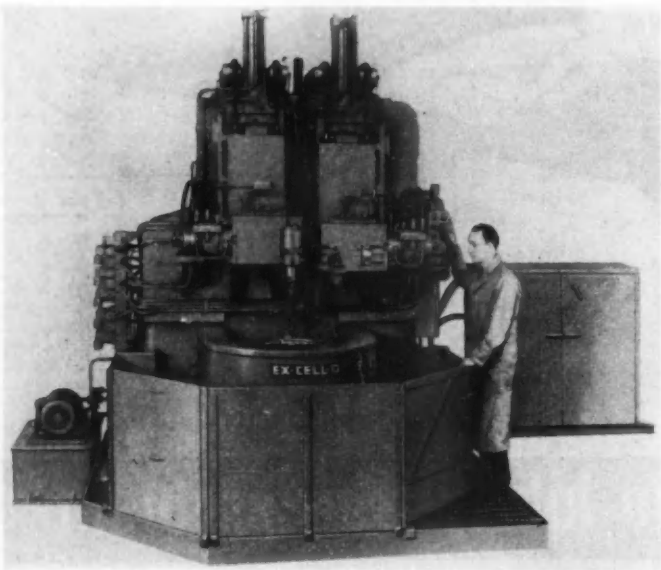


Ex-Cell-O automatic vertical precision boring machine, Style 425.

Vertical Precision Boring Machine

Recently developed and announced as available is an automatic vertical precision boring machine, designated Style 425. For multiple precision boring, turning, and facing operations, it is said to be suitable for semifinishing work as well. Operations can be performed in a choice of automatic cycles which include automatic changes in work spindle speeds.

The cast-iron base supports a column on which two vertical slides are mounted. These slides are counterweighted and operated by hydraulic cylinders. Each vertical slide carries a cross slide also powered by hydraulic cylinders. All slide ways are hardened and precision ground.

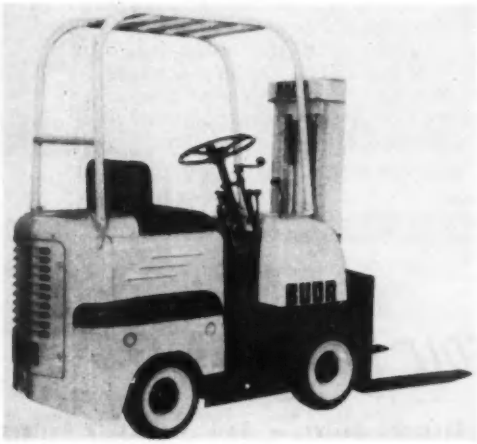
Large parts may be loaded on the 36-in. diam table, which is supported on a vertical spindle. This spindle is mounted in 24-in. taper roller bearings, and driven through a precision worm at a range of speeds up to 500 rpm.

The dominant feature of the Style 425 vertical precision boring machine is said to be its versatility. It is now being applied to multiple finishing operations on large wheels for jet aircraft engine compressors. Operations include precision boring, counterboring, chamfering, feed-facing and rabbeting.

Automatic functions of this new standard machine include all slide movements, work speed control, lubrication and coolant control. *Ex-Cell-O Corp.*

Circle E-12 on page 65 for more data

Diesel and Gasoline Powered Fork Lift Trucks



Buda 3000 lb fork lift truck.

Supplementing a line of fork lift trucks is gasoline model FT30-15 and Diesel powered model FTD30-15 now being manufactured. Rated at 3000 lb capacity at a 15-in. load center, these two models are styled with all parts being completely functional and combining the features of safety, visibility and eye-appeal, according to the maker.

Model FT30-15 is powered by a Buda four cyl 49-hp gasoline engine model 4-B-153. Model FTD30-15 is powered by a Buda Diesel engine of identical cubic inch displacement, bore, stroke and mounting dimensions.

Both models are available in five standard masts with a 72-in., 84-in., 108-in., 114-in. and 120-in. lift. *Buda Co.*

Circle E-13 on page 65 for more data

DOW CORNING SILICONES

make motors last longer

Photo courtesy Whirlpool Corporation, St. Joseph, Michigan

Saved Six $1200 Failures in 18 Months

In exhausting fumes from a line of paint spray booths, this 20 hp fan motor repeatedly painted itself to death. After about 3 months of service, the paint built up so heavily on the fan blades that the motor burned out. Each failure halted production on a 300 man assembly line; cost over 450 man hours or about $1200 per failure.

Maintenance engineers had to choose between having the fan cleaned every day, installing a larger motor, or rewinding the old one with Dow Corning Silicone (Class H) Insulation. The economy of choosing Silicone insulation is proved by the fact that this motor, rewound with Class H materials, has been operating 20 hours a day for over 18 months, or 6 times its previous life. Savings so far amount to about $7200.00.

Such performance in thousands of installations has proved that Dow Corning Silicone (Class H) insulation has 10 to 100 times the life expectancy of the next best class of insulating materials; increases the power per pound ratio in electric machines by as much as 50%.

Eliminate another common cause of motor failure; lubricate bearings with Dow Corning 44 Silicone Grease.

Especially designed for ball bearings operating at a maximum speed factor (bore in m.m. x rpm) of 150,000 to 200,000 and at temperatures from —40° to 400°F, Dow Corning 44 Grease is practically nonvolatile and highly resistant to oxidation. In open and single shielded bearings designed for high temperature operation, Dow Corning 44 has 8 to 10 times the life expectancy of conventional greases. It gives life-time lubrication in permanently sealed bearings.

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Please send me:
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- ☐ List of Class H motor repair shops.
- ☐ Data on Silicone Grease for motor bearings.
- ☐ 32-page booklet entitled "What's A Silicone?"

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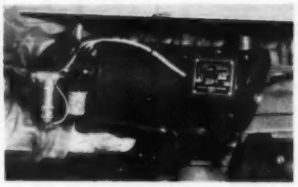
NEW PRODUCTS

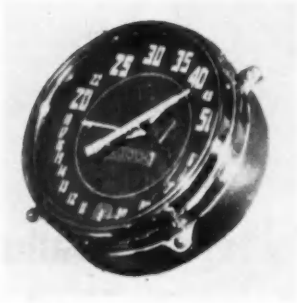
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65



Gasoline and Diesel Engine Preheater

Engine preheating equipment is now in production for the armed forces or other uses, which makes it possible to start Diesel or gasoline engines in temperatures down to minus 65 F. The equipment is adaptable to vehicles in any outdoors location where ambient temperatures dip below practical engine starting temperatures. Preheaters may be used on both aircooled and liquid-cooled engines. *South Wind Div., Stewart-Warner Corp.*

Circle P-6 on page 65 for more data

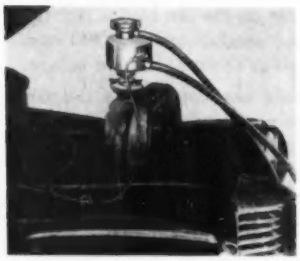


MPG and MPH Indicator

A mechanism, known as the Henstrometer, said to show the miles per gallon of gas simultaneous with the usual speedometer reading of the number of miles per hour of speed. A gas rate indicator hand on the Henstrometer shows miles per gallon while the speed rate hand indicates miles per hour on the same dial.

As an example, if the car was traveling at 40 mph the large speed hand would indicate 40. If at the same instant gasoline was being fed to the carburetor at the rate of two gal per hr, then the small efficiency indicating hand would point to 20 on the same dial as the miles per gallon being obtained at that same instant. If at the same speed the carburetor was using gasoline at the rate of three gal per hr then the efficiency indicating hand would point to 13.3 as the miles per gallon being obtained. *H. G. Strong & Associates.*

Circle P-7 on page 65 for more data

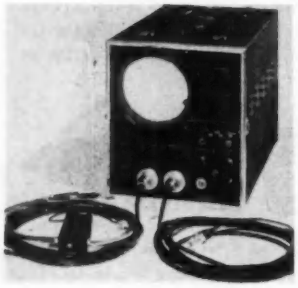


Cooling System Cleaner

A device for the cleaning of cooling systems features a cast aluminum body with a rotary-flow mixing chamber that can be attached to the filler neck of any car or truck. It is claimed to be ready to operate in less than two min, and it can be left to operate unattended.

A special chemical is introduced into the mixing chamber and with engine running for about 45 min, the chemical is circulated through the entire radiator, motor block, and heater coil system. A special electric, thermostatic cut-off stops the engine should the temperature rise above 190 F. *Trippe Manufacturing Co.*

Circle P-8 on page 65 for more data



Electronic Test Equipment

A commercial model of an electronic ignition test device, known as an Electronic Ignition Monitor, is now on the market. Briefly, this instrument uses a cathode ray tube whose horizontal deflection plates (Y-axis) are used as a time base. The cycle of the engine or 720 deg of crankshaft rotation in a four stroke cycle engine is the time base. The last cylinder in the firing order of the engine triggers the horizontal beam and causes it to sweep across the screen. All diagrams appear on the screen beginning with number one cyl on the left side and the others follow in the engine firing order. The use of the last cylinder in the firing order permits a complete diagram of one cyl to appear at the start of the sweep. The first impulse of the igni-

(*Turn to page* 168, *please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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FREE LITERATURE

Ignition Analyzer

A question and answer booklet on an ignition analyzer has been recently released. The adaptation of the oscilliscope as an ignition analyzer is fully described for both permanent and portable installations. *Scintilla Magneto Div., Bendix Aviation Corp.*

Circle L-1 on postcard for free copy

Stainless Steel Fasteners

Anti-corrosive nuts, screws, rivets, washers, and cotter pins are listed by AN specification on a sliding-type scale that is now available. This scale provides the diameter and type of the various parts as well as providing the makers catalog page number. *Anti-Corrosive Metal Products Co., Inc.*

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Jet Engine Starting

An eight-page folder is now available outlining methods of jet engine starting with rotating type d-c generators—both electric motor and gasoline engine driven, as well as self-propelled. *Motor Generator Corp.*

Circle L-3 on postcard for free copy

Vibration Absorbing Felt

A 19-page booklet is now available concerning a vibration absorbing felt for machine tool use. Typical examples are given of various equipment isolated with three different felt materials. Frequency diagrams are provided. *Western Felt Works.*

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Jet Blades and Buckets

The latest issue of Tool Tips, Vol. 26, No. 5, contains an article on a standard machine tool for jet blades and buckets. Drawings are provided which illustrate several of the operations involved. *Ex-Cell-O Corp.*

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Die Casting Lubricants

Four die casting lubricants, developed expressly to provide clean, accurate castings, longer die life and more economical production according to the maker, are completely described in a new, illustrated folder entitled, "Houghton's Die Casting Lubricants." *E. F. Houghton & Co.*

Circle L-6 on postcard for free copy

Motor Case Histories

Over 100 case histories of outstanding applications of Life-Line motors are depicted in a 35-page booklet, B-4769, that is now available. *Westinghouse Electric Corp.*

Circle L-7 on postcard for free copy

Electric Tools

Just published is a 36-page catalog, Form 5111, covering a complete line of Multi-Cycle electric tools. The catalog is divided into eight sections; Impactools, nut runners, drills, screw drivers, grinders, buffers, sanders and polishers. *Ingersoll-Rand Co.*

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(Please turn page)

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Please send me additional free information on the items described in this issue of AUTOMOTIVE INDUSTRIES, the code numbers of which I have circled below:

6/15/52

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20		P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21		P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22		P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23		P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24		P-6	P-12	P-18	P-24	P-30

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General Purpose Motors

Construction features, ratings and dimensions of open drip-proof (Type AP) and splash-proof (Type APWW) squirrel-cage induction motors in ratings of ½ to 100 hp are described in a recently released bulletin, 51B6210D. *Allis-Chalmers Mfg. Co.*

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Hydra-Matic Service

A 12-page booklet describes and illustrates a complete line of Hydra-Matic transmission service tools. The tools are presented in functional groups covering: (1) Making adjustments without removal. (2) Adjusting and repairing. (3) Disassembling and repairing. (4) Equipment for handling the transmission. *Kent-Moore Organization, Inc.*

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Automatic Gaging and Sorting

Now available is a 20-page bulletin that illustrates various types of automatic gaging methods and gages. This also includes continuous measuring gages. *Federal Products Corp.*

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Precision Grinding Machine

Just issued is a four-page bulletin describing the new 30 in., 36 in., 48 in. Type CHW plain grinding machine. This machine was designed to accomodate large diameter work pieces. *Landis Tool Co.*

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USE THIS POSTCARD

File Handles

A literature piece recently released describes safety file handles for all types of industrial filing. *Remont Manufacturing Co.*

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Electrical Fittings

Catalog 52 describes a complete line of solderless wire connectors, cable and conduit fittings and wiring devices. It contains illustrated descriptive information on "pres-SURE-connectors" for solderless wire splicing and terminating. *Buchanan Electrical Products Corp.*

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Aircraft Adhesives

Adhesives, coatings and sealers used in aircraft manufacture and maintenance are described in a 14-page booklet that is now available. The booklet contains 30 photographs and illustrations, and provides design and producton data on 13 major products such as strippable coatings to protect metal surfaces during fabrication, and integral wing tank sealers for closing seam-gaps and other crevices in fuel-storage spaces. *Minnesota Mining and Manufacturing Co.*

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Torque Converter

Publication of a four-page illustrated bulletin, No. TC-639, presents information on the Torcon heavy-duty automatic hydraulic torque converter. Illustrated in the catalog are the three elements of the unit pump, turbine and reaction member. *Torcon Corp.*

Circle L-16 on postcard for free copy

Honing Stones

A catalog covering the complete line of mounted honing stones for all the popular cylinder and honing machines in the automotive service field has been announced. *Abrasive Service Industries.*

Circle L-17 on postcard for free copy

Manufacturing Processes

A 24-page pictorial brochure just published reveals many examples of manufacturing processes and equipment in a metal stamping plant and in a die-making plant. *City Auto Stamping Co.*

Circle L-18 on postcard for free copy

Seamless Cold-Drawn Tubing

The use of seamless cold-drawn carbon steel mechanical tubing in the production of hollow precision parts are outlined in a new data card, TB 339, published recently. *Tubular Products Div., The Babcock & Wilcox Co.*

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Renegotiation

There is a limited supply of reprints available on renegotiation. Entitled "How to Protect Yourself for Renegotiation," it deals with the features of the Renegotiation Act. *Automotive Industries.*

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(*Please turn page*)

You don't have to pay BIG MONEY to get BIG TRUCK advantages

Industry cuts handling costs with YALE *WORKSAVERS*

YALE WORKSAVER Electric Trucks are ideal where size and weight make big trucks impractical...over low-load floors; in freight elevators; railroad cars and trucks.

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***Yale's Electric Hydraulic Powered Hand Truck**

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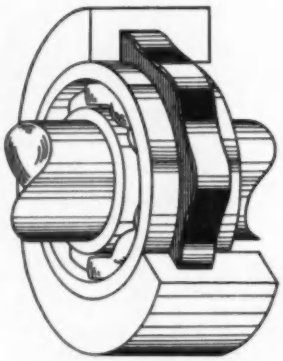
NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Bearing Anti-Rotation Device

A device has been announced which is said to successfully prevent spin and creep of the outer race of a floating bearing. The anti-rotation device, composed of a waved steel spring and



Scintilla anti-rotation device.

a molded rubber ring, is designed to prevent outer race rotation. It is claimed to be equally effective in aircraft accessories, high-speed hand tools, electric motors, and other power tools. It is available for use with most popular sized millimeter bearings. *Scintilla Magneto Div., Bendix Aviation Corp.*

Circle P-1 on page 65 for more data

Pressure Filled Metallic O-Rings

Development of pressure filled metallic O-rings has been announced for static sealing requirements. UAP/-WILLS metallic O-rings are hollow metal tubing rings filled with inert gas at 600 psi. They are said to offer positive metal to metal static seals wherever heat, pressure, corrosive liquids or gases are involved.

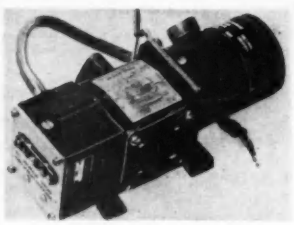
Metallic O-rings can be installed in present ring grooves, in free machined recesses, or with a special compression limiting device which can be incorporated in the rings, can be installed without grooves or recesses. These rings will hold, according to the producer, against pressures as high as 20,000 psi and withstand temperatures limited only by the "physicals" of the metal.

Standard rings of stainless steel, or of mild steel cadmium or nickel plated are available now in experimental quantities in sizes ranging from 11/16 in. to 40 in. OD in increments of 1/16 in. *United Aircraft Products, Inc.*

Circle P-2 on page 65 for more data

Rotary Actuator

A lightweight rotary actuator for driving flexible shafting in remote operating mechanisms, has recently been introduced. The unit was designed for operation on 220 v, 400 cycle, three phase a-c current. Motor of the unit is said to be capable of



Hydro-Aire rotary actuator.

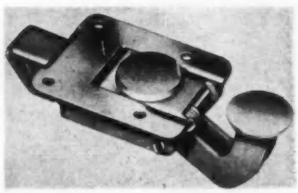
operating at all altitudes up to and including 50,000 ft, and through an ambient temperature range of from minus 65 to plus 200 F. Output is rated at 13 lb-in. at 2900 rpm of the output shaft. Limit switches control turns of output shaft, and a three phase a-c brake stops output shaft within approximately ten turns.

Intermittent operation is one-min on—19-min off. Horsepower is rated at 0.6, with the motor fully protected against thermal overloads, internal condensation, and entrance of foreign matter.

The unit can also be adapted to 24 v d-c operation. Entire unit is approximately 1.25 in. by three in. by 2.75 in. and is mounted on four drilled pads. Weight is approximately five lb, six oz. *Hydro-Aire, Inc.*

Circle P-3 on page 65 for more data

Push Button Flush Latch



Hartwell push button flush latch.

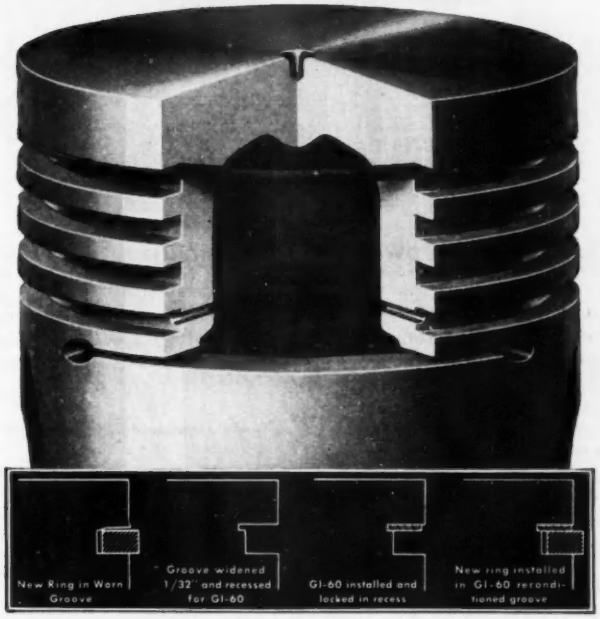
Designated part No. H-4100, a push button flush latch, is specially designed for a variety of aircraft applications. The makers claim that the unit is self closing and easy to operate. As the forward button is depressed, the rear button raises, providing a grip for opening the door. It is available in stainless steel, cadmium plated cold rolled steel or aluminum alloy. Weight of the unit is 0.7 ounce to two ounces, according to material. *Hartwell Aviation Supply Co.*

Circle P-4 on page 65 for more data

(*Turn to page* 128, *please*)

Sealed Power Pioneered

the only dependable, economical answer to top-ring groove wear



Sealed Power GI-60 Groove Insert

STILL ALONE IN ITS FIELD

Top-ring groove wear is a problem as old as piston rings. Top-ring grooves have always had the least lubrication, the most heat, the heaviest wear. Many remedies were tried. Regrooving and installing wider rings violated the intent of the engine designer. A loose, floating spacer amounted to the same thing as using a wider ring in two sections.

Sealed Power engineers wrestled with the problem for years, and came up with the only satisfactory answer to date. It is a heat-treated, spring-steel insert, securely anchored to the top of the ring groove, which has been regrooved to an absolutely true surface 1/32" wider than before. A recess 1/32" wide is cut at the top, and the insert locks itself permanently into this recess, held by its own inward tension, and dished to hug the top of the groove. It is called the Sealed Power GI-60 Groove Insert.

Many fleet owners are now using Sealed Power GI-60 on new replacement pistons, as well as re-conditioned pistons. One reports that pistons in his fleet formerly averaged less than 50,000 miles. Since adopting the standard practice of installing GI-60, average life has increased to more than 200,000 miles.

Sealed Power GI-60 Groove Insert is only one of many improvements originated by Sealed Power, leader in the field since 1911.

SEALED POWER CORPORATION, MUSKEGON, MICHIGAN

Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

The BUSINESS PULSE

Retail Inventories Continue Decline as General Business Activity and Employment Remain at High Levels. Expenditures by Consumers and Government Up With Some Price Declines. Congressional Budget Cuts Predicted.

Inventories Down, Employment Up

Forecasters in some of the less favorably situated industries are currently taking a more optimistic view of the business future than they have done for some time. While scattered layoffs have been announced in industries producing some types of consumers' durable goods, signs of improvement are reported in several branches of the textile and other consumer-goods industries, where conditions had been static or depressed.

Retail inventories declined again in March for the tenth consecutive month, and it appears that a large part of the post-Korean inventory accumulation at the retail level has now been digested. Leading retail merchants are reportedly hopeful that sales losses incurred in recent months will be balanced out by greater turnover in the third and fourth quarters.

Available indexes reveal that overall business activity is being sustained at a high level. The index of business activity compiled by the Guaranty Trust Co. was fractionally higher in April than a month earlier, standing at approximately the level that has prevailed for two years. A preliminary calculation indicates that the Federal Reserve index of industrial production fell by about one per cent from March to April, but at least half of the decline seems to have been due to the brief stoppage of steel production.

Civilian employment is at a very high figure. It is estimated that in April more than 60.1 million persons were employed, as compared with 59.7 million in March and 60.0 million in April, 1951. Unemployment is placed at the lowest level since September of last year, and it is believed that rising employment will soon enable the Government to disband the "task forces" created to relieve unfavorable conditions in those industrial communities where workers were displaced by the diversion of materials from civilian to military production.

Federal, Consumer Spending Rise

While consumers are still spending a smaller percentage of their disposable income than they were a year ago, the available data reveal that they are currently spending more, percentagewise, than in the final months of 1951. Department stores report that in recent weeks sales have been running at about the level of a year ago, whereas during the first quarter of this year they were appreciably smaller.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Outlays made by the Federal Government continued to rise during the first quarter, attaining an annual rate $20 billion above that of the first three months of 1951. Similarly, new construction and purchases of capital equipment showed gains. Partially offsetting these increases in demand, however, was the almost total disappearance of inventory accumulation. Wholesale and manufacturing inventories did increase, on a seasonally adjusted basis, but retail inventories, as mentioned before, continued to fall.

The net result of these several changes was a further increase in the gross national product to an annual rate of $339.7 billion in the first quarter, as compared with $334.6 billion in the last three months of 1951. In the first quarter of last year, the gross national product was running at an annual rate of $319.5 billion.

Prices of a Few Commodities Fall

The approximate stability shown in wholesale prices and the cost of living in recent weeks has tended to obscure continued declines in prices of raw materials and other basic commodities. These latter are reflected in the wholesale price index of the Guaranty Trust Co., which dropped by two per cent from mid-April to mid-May and now stands some 18 per cent below the peak figure of February, 1951.

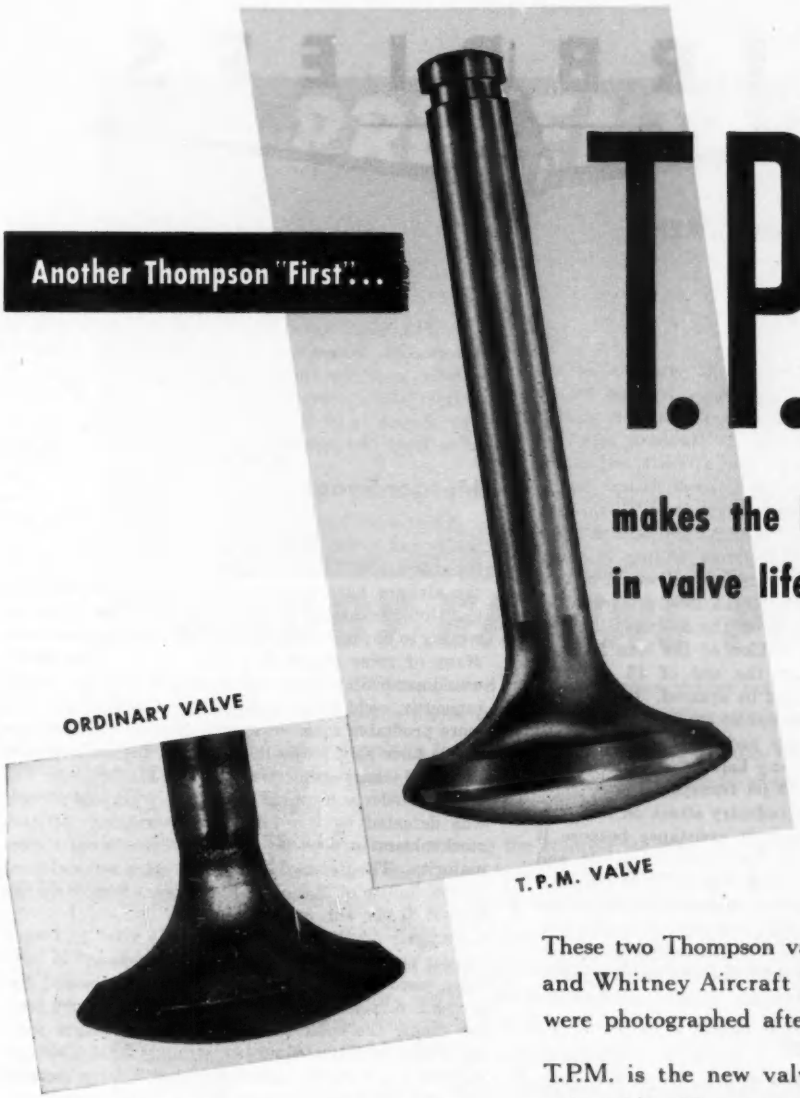
Outstanding among recent declines are two reductions in the price of lead, totaling more than 20 per cent. An even sharper drop has recently occurred in the price of industrial alcohol. The Government has announced that natural rubber will be made available to consumers in June at 38½ cents per lb, which is 10½ cents below the price charged heretofore.

(*Turn to page* 107, *please*)

Another Thompson "First"...

T.P.M.

makes the big difference in valve life



These two Thompson valves from Pratt and Whitney Aircraft R-4360 Engines were photographed after first overhaul.

T.P.M. is the new valve material developed by Thompson to give greater corrosion resistance and higher strength at valve operating temperatures. T.P.M. is a result of Thompson's vast experience in valve development and knowledge of the behavior of metals at high temperatures.

Other Thompson "firsts" include a new coating alloy for valve heads and faces, and stem-peening to provide harder, more wear-resistant stem surfaces.

VALVE DIVISION
Thompson Products, Inc.
EUCLID, OHIO

YOU CAN COUNT ON THOMPSON FOR ENGINEERING LEADERSHIP

AIR BRIEFS

By ROBERT McLARREN

Forcing Subsidy

Despite the simple fact that all previous Government subsidy proposals have been rejected by the industry and the Congress, the present administration continues undaunted in its stubborn insistence on forcing public funds on the aircraft and airline industries for new transport construction and/or operation. Latest proposal comes from Civil Aeronautics Board chairman Donald Nyrop, who wants to grant any airframe manufacturer willing to accept it a fund of $15 million. This amount would be used to pay for the development of a new jet transport. As production models come off the assembly line, the builder would cancel $1 million of the loan for each airplane delivered and at the end of 15 delivered airplanes the account would be squared. In the event no planes have been delivered at the end of 10 years, the manufacturer must pay back the $15 million plus one per cent interest or any balance left in the case of delivery of less than 15 jet transports.

Donald Douglas led the industry attack on this one: "We do not want Government assistance because it inevitably carries with it limitations, controls and influences which make it more difficult to do the job." Despite a solid military-airframe-airline opposition to all such subsidy proposals, the administration continues to press for the idea. Here seems to be one segment of industry that must actually battle against socializing!

Jet Issue Red Hot

The smouldering problem of a U. S. jet transport continues to boil hotter and hotter with the inauguration of British jet airliner service adding another burner to the fire. Everybody involved knows full well that U. S. airlines will be operating U. S. jet transports sooner or later and arguments over that point are purely academic. The only question is when, and it now appears that the airlines, most probably Pan American Airways, hold the key to the answer. Douglas, Lockheed and Boeing now have well-developed jet transport designs ready to go on signal in the form of any substantial order from an airline. Douglas' design is a huge 200,000-lb giant most useful for long-distance, high-altitude routes. The Lockheed L-193 weighs about 150,000 lb and will carry 50 passengers at a 550 mph cruising speed. The Boeing Model 473 is a 135,000-lb model cruising at 500 mph with 60 passengers. Consensus seems to be that the latter two are too small for the job, the major criticism of the deHavilland Comet, which carries only 40. The ideal now shapes up as 80 passenger capacity with a speed of at least 550 mph for at least 1500 miles non-stop.

Merger Snags

As reported here previously, a rash of merger proposals has swept through the airline industry. The impetus behind this unexpected development is simple; the airlines have decided to do for themselves what the Civil Aeronautics Board has been unable or unwilling to do; provide sound economic route structures. Many of these proposals worked out in great detail, would establish new giants in the industry and, simultaneously, weld together more logical and (therefore) more profitable route segments. Several of these proposals have sailed smoothly through the endless technical and legal complications only to hit the stone wall of stockholder approval. The Capital-Northwest merger was defeated by the failure of Northwest Airlines stockholders to vote the necessary two-thirds shares majority. The Colonial-National merger was defeated by the failure of National shareholders to provide the modest 51 per cent majority needed.

Analysis of these developments, so vital to future merger proposals, indicate that the "holdouts" in both cases were large individual holders who balked for personal reasons rather than any broad, general feeling among the holders. Meanwhile, the merger rash has struck some airlines so strongly that Colonial Airlines has virtually asked for "bids" for a merger with any other airline interested and is accepting proposals against a July 1 decision deadline.

Complaints Cured

In 1949 the National Advisory Committee for Aeronautics demonstrated a "quiet" lightplane, one in which the engine had been muffled and the propeller made to turn slowly. These comparatively minor modifications resulted in a personal aircraft that was virtually noiseless as it passed over at only a few hundred ft. altitude.

These actual flight tests proved that the lightplane industry *could* make quiet airplanes by very simple and inexpensive modifications. The NACA in conjunc-

(*Turn to page* 76, *please*)

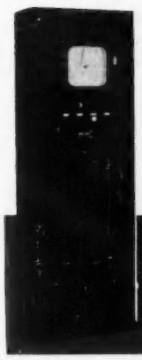
STANDBY ENGINE POWER

Many of the Air Lines have installed automatic engine driven pumps in their hangars at the principal air terminals to insure against failure of water supply in case of fire.

Also, most main air terminals have automatic standby generator sets which will supply current for the lights and control tower within a few seconds, should the commercial source of power fail.

SYNCHRO-START has been making the controls for these power plants for the past twenty (20) years and have the "know how" to build controls that remain dependable. They are in use for every conceivable power application on land, sea, air, and in the mines.

The Universal Automatic Engine Control panel shown, is for fire protection to automatically START-STOP, and give the ALARM when needed and to record the operations including automatic test runs. They are accepted as wholly dependable protection against fire by insurance companies and are in use in a great many of the nations largest industrial, public, and residential buildings.



These panels are manufactured exclusively for Alexander F. Barron, 53 West Jackson Boulevard, Chicago 4, Illinois, who are suppliers of fire protection equipment.

We can furnish controls to meet any application where Gas, Gasoline, or Diesel engine power is used. Write us for our catalog and address of our nearest representative.

Muffler of Improved Design for High Compression Engines

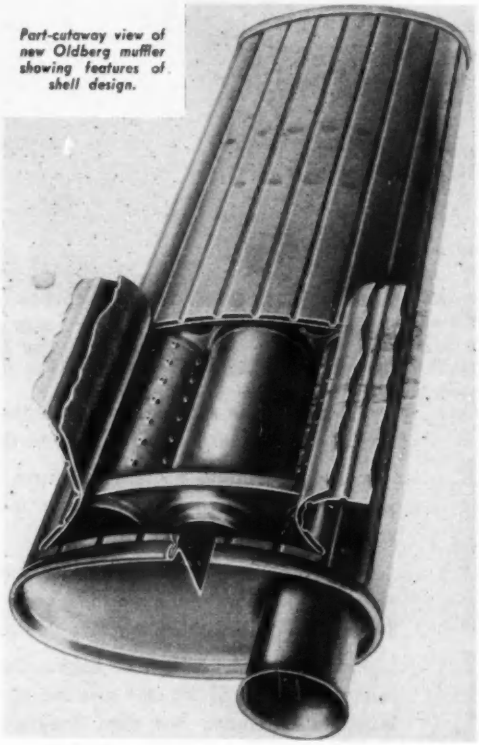
WITH the introduction of new high performance engines for 1952 considerable improvements and changes have been effected in muffler design to cope with excessive shell noises incident to the exhaust systems of high compression engines.

Illustrated here is what is claimed to be a simple but remarkably effective improvement in muffler design developed by the Oldberg Mfg. Co., Grand Haven, Mich. This type of muffler is standard equipment on several makes of 1952 cars and is expected to be adopted on others in the near future.

Oldberg engineers have been wrestling with the problems of exhaust system noises for some 43 years. The new muffler shell represents the latest development—a simple solution said to establish advanced standards of exhaust silencing. The principle feature is the formation of a series of longitudinal ribs in the outer shell. These ribs barely touch the inner shell and thus form a series of parallel chambers about 1¼ in. wide. The dead air spaces thus produced serve to absorb shell vibrations and to prevent the transmittal of shock waves in the system.

It is of interest that this type of design dispenses with the asbestos packing used in mufflers of this type heretofore. Not only does it simplify constructional detail, but, according to Oldberg engineers, the new muffler is expected to be longer lived. In addition to using heavier gage materials, which contribute to longer life, there is also less possibility of corrosion due to entrapment of water at the ends.

Also noteworthy is the fact that on the several 1952 cars using this muffler as standard equipment, the muffler shell illustrated here is installed in conjunction with a separate resonator chamber, housed conveniently in accordance with the chassis layout.



Part-cutaway view of new Oldberg muffler showing features of shell design.

• • •

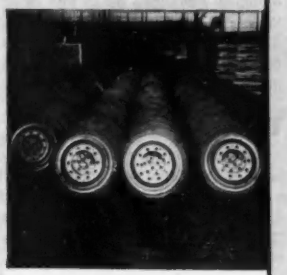
Air Force to Simplify Parts Nomenclature

Indentification of many aircraft parts will soon be made easier for designers and engineers through a move that reportedly will reduce by 25 times the number of titles different manufacturers now give to similar parts. Under the plan, announced recently by the Air Material Command's Supply Div., approximately 150,000 various manufacturers' part names will be boiled down to a total of about 6000.

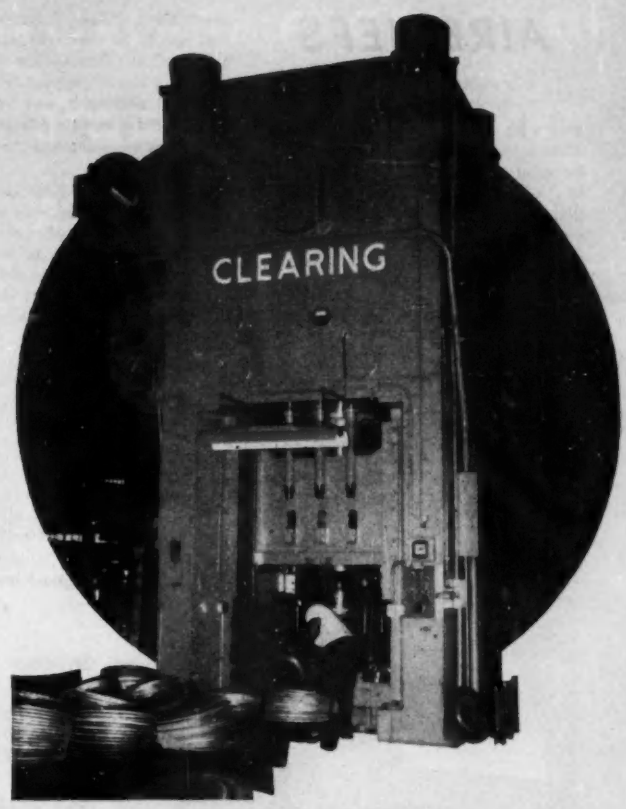
Parts involved in the streamlining of terminology are only special aeronautical items that are made by one manufacturer and used solely in his end product. In effect, the plan, which will be set up under the Federal Catalog Program, is designed to rule out variations in names of parts which individual plane makers hit upon in the past to describe what are substantially the same items.

Vonnegut Moulder Changes Name

A corporate change has taken place in the Vonnegut Moulder Corp. The company is now known as Grinding and Polishing Machinery Corp.



Wheels for M47, M48 and T43 army tanks produced on the huge Clearing press.



GIANT AT WORK

Heavy-duty wheels—for tanks and other equipment used in defense, construction, agriculture and elsewhere—are formed from half-inch stock on this big Clearing press at Motor Wheel Corporation, Lansing, Mich. The press has the equivalent of 4300 tons drawing capacity, each of the eccentric gears weighing 13 tons, and its work area is 64 by 72 inches.

Motor Wheel turned to Clearing for this production giant because they knew Clearing could combine extreme accuracy of operation with the great size and strength demanded by the job. The crankless principle, coupled with long gibbing and the guided plunger—all Clearing creations—achieve the required result.

Your pressing job is probably different, but whatever it may be, you'll find Clearing engineers can show you how to attain maximum production quality as well as quantity. Consult us now, while you're planning future operations.

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS

HAMILTON DIVISION, HAMILTON, OHIO

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

AIRBRIEFS

(*Continued from page 72*)

tion with the Aeronautical Research Foundation has followed up this work by conducting a three-year program of "audience reaction" in New England in which both standard and quiet versions of lightplanes were flown in a local area and the residents interviewed to determine their reaction. The report of this extensive program makes the following significant conclusion: "The findings indicate that at the 10 sites within and about metropolitan Boston the degree of noise reduction previously found to be aerodynamically and structurally feasible did eliminate substantially all neighborhood objections to noise per se.

There is now no question that the personal aircraft industry now has in its hands the means of overcoming the most potent objection to its product. The next move is up to the industry but we privately predict that it will follow its historic do-nothing attitude on such advances as it has done for 20 years in the matter of slow-flying, anti-stall characteristics, detailed information on which has been at its disposal for that entire period.

The Letup

Washington's hectic post-Korea buildup has now simmered down to a noticeable hush to the bafflement of the citizen and the aircraft industry. It now seems certain that it was the resignation of Charles E. Wilson that broke the back of Washington enthusiasm for the buildup and since this spark-plug left town the program has settled back to virtual pre-Korean normalcy. Administratively, the program has virtually collapsed. The resignations of Harold R. Boyer and Clay Bedford has left the aircraft program running itself. The Aircraft Industries Association has proposed two industry canditates for chairmanship of the Aircraft Production Board but the administration continues to support William C. Campbell, now Defense Production Administration deputy for procurement and production. The post is the one being vacated by Manly Fleischmann, who was also an energetic supporter of the program. AIA suggests that either LaMotte Cohu, Convair vice-chairman, or William C. Jordan, former Curtiss-Wright president, both vastly experienced aircraft production men, be given the post.

However, the sinking ship seems oblivious to such possible lifesavers. Only a few days after creation of the Production Policy Advisory Commission, a joint agency of the Office of Defense Mobilization and the Defense Department, the unit was divorced completely from the latter agency and, renamed the Advisory Committee on Production Equipment, handed over to the ODM entirely. The group now is concerned wholly with machine tools, which puts it in direct competition with the Munitions Board.

Meanwhile, the aircraft industry output was only one per cent behind schedule going into April, reflecting the fact that the schedules have now been cut back to suit production, rather than vice-versa. As a result of all this, the aircraft industry says it now needs only 750,000 employees by the end of this year, instead of the million requested earlier.

Quarter-Century Club

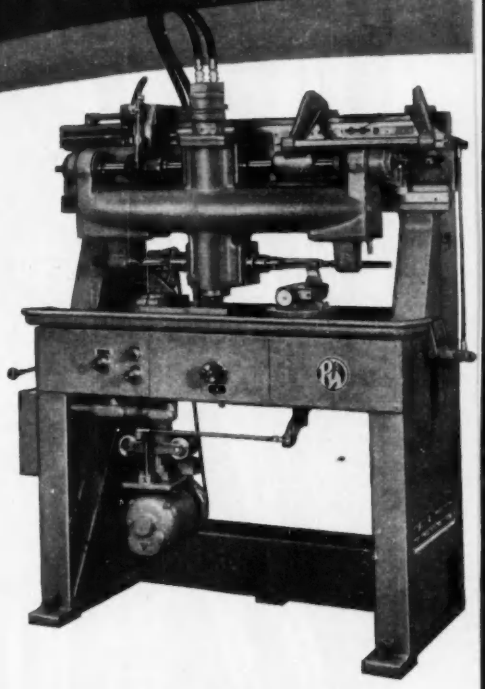
Many of today's executives place the beginning of the real growth of the aviation industry at the year 1927, beginning, specifically with Lind-

(*Turn to page 78, please*)

SPEED UP JET BLADE PRODUCTION

Automatically WITH PRATT & WHITNEY

TURBINE BLADE AIRFOIL GRINDERS



- AUTOMATIC — ENTIRE AIRFOIL GROUND IN ONE OPERATION, INCLUDING LEADING AND TRAILING EDGES
- GRINDS *ALL* IRREGULAR AND TWISTED AIRFOIL SECTIONS
- ACCURACY HELD TO ± .003"
- EASY TO OPERATE — ONE LOADER CAN SERVE BATTERY OF GRINDERS
- EACH BLADE A GOOD BLADE — UNIFORMLY ACCURATE
- MINIMUM SCRAP LOSS AND INSPECTION COST

Here is a solution to the demand for more and more jet blades. The P&W Turbine Blade Airfoil Grinder is the ultimate for exactly reproducing dimensions and shape from a master. Any forged or fabricated jet engine blade up to 9" x 4", having *any* irregular and twisted airfoil section, is precision ground in a single automatic cycle.

This newly-developed machine, utilizing the advantages of a high-speed coated abrasive belt, provides industry with a precision production blade grinder — *not* a polisher — that insures lowest cost per blade.

The P&W Grinder features an exclusive 5-cam system that controls the shape, angle of the grinding contact, variation of work rotation speed, compound motion for grinding to angular blade roots, number of passes and amount of stock removed . . . plus speedy loading.

The complete airfoil section — including the important leading and trailing edges — is finished and smoothly faired regardless of the angle of the blade root. Close and consistently uniform tolerances are maintained.

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice P&W *for Accuracy*

PRATT & WHITNEY — Div. Niles-Bement-Pond Co.
18 Charter Oak Blvd., West Hartford 1, Conn.

Gentlemen:
PLEASE MAIL ME COPY OF YOUR TURBINE BLADE AIRFOIL GRINDER FOLDER.

NAME_____

POSITION_____

COMPANY_____

CO. ADDRESS_____

CITY_____ ZONE_____ STATE_____

(Continued from page 76)

bergh's historic flight to Paris. Throughout the remainder of the year the anniversaries of famous flights will be recorded, including those of Admiral Byrd (trans-Atlantic), Clarence Chamberlain, Ruth Elder and George Haldeman and many others. Thus, U. S. aviation passes the quarter-century mark in its history of trans-oceanic flying and the job of conquering distance with the flying machine. Significantly, more than 8000 passengers will cross the Atlantic by air *each week* during this 25th anniversary of its initial taming by the airplane in non-stop flight.

Surface Combustion Corp. Holds Instruction School

An operating instruction school for its customers was held recently by Kathabar Div. of Surface Combustion Corp., Toledo, O. The school was designed to instruct customer personnel on the maintenance and operating procedures for Kathabar humidity conditioning equipment.

Gasoline Demand Rose Again in Year 1951

Domestic demand for gasoline in 1951 rose more than eight per cent for the second consecutive year, the American Petroleum Institute reported recently. It reached an all-time high total of 43,888,727,000 gallons, more than three billion gallons above the 40,617,285,000 gallons consumed the previous year.

Gasoline production in the U. S. passed the billion barrel point for the second straight year in 1951. It totaled 1,139,511,000 barrels, or 47,859,462,000 gallons, and accounted for 42 per cent of all petroleum products refined last year.

Advanced Radar Set Developed by RCA

A new lightweight radar set that is said to "map" every detail of terrain and weather obstacles up to 200 miles in front of an aircraft is now in production for the Navy and Air Force by Radio Corp. of America.

The advance radar unit, which has already been installed on President Truman's plane and on various military air transports, is also suited for commercial aircraft, according to RCA. At the present time, however, the equipment is being produced under Navy contract for military use only and is scheduled for production under an Air Force contract.

More Money on Auto Radios

"What we're making on radios doesn't add up to peanuts when you figure on our production delays, field complaints, and . . ."

"Take it easy, Fred! Let's talk to Bendix. On their record, they can give us the production...the quality... and the price we're looking for."

TALK TO **Bendix** MOST TRUSTED NAME IN **Radio**

That's right! Bendix can *positively* show you how to make more profit on your automobile radios.

First of all, Bendix* Radio has solved more problems *and tougher problems* than any other radio manufacturer. That's a plus to remember if you get snowed under with field complaints about your present radio. And, too, Bendix understands quantity production—from the precision methods involved to the split-second timing that's necessary to meet tight schedules. It is this production know-how that has made Bendix a leading automotive supplier.

Working closely with the automotive industry has taught Bendix plenty about price, too. They know that on high-production units, a few cents can mean the difference between profit and loss. Their engineers are constantly developing circuits with fewer components and lower cost.

If you want to cut the cost and improve the quality of your auto radios, call Bendix.

*REG. U. S. PAT. OFF.

Get the complete story from our Detroit office.

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BENDIX RADIO DIVISION of Bendix AVIATION CORPORATION

BALTIMORE 4, MARYLAND

Strangling Competition

(*Continued from page* 33)

and wage controls. Management is diverted from its productive tasks and must spend a great deal of time interpreting control measures and planning operations with the controllers in Washington.

To deal with temporary and abnormal scarcities of commodities such as copper and nickel or machine tools we need only a simple system of priorities on defense contracts. The mounting body of emergency controls with which we are faced today were conceived in panic, applied in haste, and are as strangling as weeds in a garden.

If NPA controls as to the number of cars each company may build were to remain in effect for too long a period of time, or if the management of each company thought these controls were to become permanent, the automobile industry would cease to make progress. Such a state of affairs would automatically kill the competitive system.

Furthermore, I believe that unless controls are abandoned within a relatively short time, they will begin to destroy the very freedoms we are committed to defend. Spokesmen for controls point to the Constitution as a defense for freedom and, at the same time, attempt to circumvent it through a series of accomplished facts such as the seizure of the steel industry; and, continually, in order to panic at least a semblance of public support for further controls, they tell us that the so-called "emergency" may last a lifetime.

Of course, the cry of "emergency" eventually loses its appeal. Pretty soon, the planners who say they want planning only for an emergency are going to say they want planning for still another reason. As some of you may have observed, the change of signals came only last month, given by no less than Mr. Truman himself in his speech at a Department of Agriculture ceremony in Washington, D. C.

He accused his critics of spreading "bunk and hokum." And then he went on to say that the Roosevelt and Truman administrations have proven that a planned economy works, in agriculture and in every other aspect of our national life. He defied anyone to call this Socialism and said he was proud to accept the name "Trumanism" for his program.

Let's not get into a baby-naming contest, for if there is one art the planner has learned it is that of changing his label according to circumstances. In the conception of their functions, in their personalities, in their motives, and in the ends they pursue, the men who seek to plan the American economy no more resemble the British Socialists than the latter resemble the men of the Politburo.

The real point is that all these men, in their different ways, have accepted the concept that a centralized Government power is the guiding motive for the nation. When we say that the Soviet system has failed or that British Socialism has come near to destroying the economy of Britain, what we mean is that planning has failed. It is impossible for controls and the free, independent spirit of humanity to exist together in the same national community. The struggle must always end in the defeat of one or the other.

The above article is an abstract of a paper presented recently at a meeting of the Adcraft Club, Detroit, Mich.

2 ways to ease your Steel Shortage

1 Collect all dormant Steel Scrap and get it to the steel producers

Millions of tons of valuable scrap still lie idle in America. Scrap salvage means more production—a stronger America. Clean out your plant . . . sell all your iron and steel scrap to your local scrap dealer now. The need is urgent. Every bit will help to meet the needs of defense production.

2 Make your steel supply go farther —specify N-A-X HIGH-TENSILE STEEL

Users of N-A-X HIGH-TENSILE steel find they can make 3 tons do the work of 4. Through its high strength and corrosion-resistant properties, lighter sections can be used without sacrifice of quality. It fabricates and welds with the ease of mild carbon steel. Let us assist you in applying this economy to your products.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division — Ecorse, Detroit 29, Mich.

NATIONAL STEEL CORPORATION

CALENDAR

OF COMING SHOWS AND MEETINGS

Triennial Meeting of the International Organization for Standardization, Columbia University, New York, N. Y.....June 9-21

Industrial Finishing Exposition, Chicago, Ill. .....June 16-20

First International Exhibition of Aircraft Parts and Equipment, Hotel Park Sheraton, New York, N. Y.....June 17-19

American Society of Mechanical Engineers, Applied Mechanics Div., Shock and Vibration Instrumentation Symposium, State College, Pa. .....June 19-21

American Society for Testing Materials (annual meeting), New York City .....June 23-27

SAE West Coast Meeting, San Francisco, Calif. .....Aug. 11-13

Third Annual Elkhart Lake Road Races and Rally, Sports Car Club of America, Elkhart Lake, Wis. .....Sept. 5-7

American Standards Assn., Third National Standardization Conference, Chicago, Ill.....Sept. 8-10

Instrument Society of America (sixth annual meeting), Cleveland, Ohio .....Sept. 8-12

SAE Tractor Meeting, Milwaukee, Wis. .....Sept. 9-11

16th Commercial Show, Earls Court, London, England .....Sept. 26

SAE National Aeronautic Meeting, Los Angeles, Calif.....Oct. 1-4

Paris Automobile Show, Paris, France .....Oct. 2-12

Society of Industrial Packaging and Materials Handling Engineers, 7th Annual Exposition, Chicago, Ill. .....Oct. 14-16

37th International Motor Exposition, London, England .....Oct. 22-Nov. 1

National Metal Show, Convention Hall, Phila., Pa.....Oct. 20-24

SAE Transportation Meeting, Pittsburgh, Pa. .....Oct. 23-24

1953

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 24-27

American Society for Testing Materials, Spring Meeting, Detroit, Mich. .....Mar. 2-6

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill.....Mar. 16-20

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. .....May 18-22

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J....June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill., Sept. 21-25

ANNOUNCEMENT

by

The New Britain Machine Company

THE New Britain Machine Company proudly announces to American industry the NEW BRITAIN +GF+ Copying Lathe. Designed and first introduced in Europe by George Fischer Limited, of Schaffhausen, Switzerland, this contour lathe has proved to be an outstanding performer in hundreds of metalworking plants. For the past few years several well-known American plants have had a chance to thoroughly test this tool under our production methods and have been enthusiastic over the results. We sincerely feel that this lathe has proven itself through a rigorous and more than adequate trial period. Therefore, we are pleased to have received from George Fischer the rights to manufacture this lathe in America.

This contour lathe is built on a principle never before seen in any popular lathe. The copying saddle in which the cutting tool is mounted is below the spindle which results in two benefits of primary importance to today's production efficiency: the flow of chips from the fast cutting carbide tool falls entirely free unhindered by any flat bed, and the chip pile accumulates through the back of the machine for easy removal. Also contributing to its overall efficiency is the fact that the master template or prototype is mounted on the operator's side of the machine, making it accessible for adjustment and change-over without in any way inconveniencing the operator. These main features together with a powerful drive and wide range of feed and speed changes make this lathe a profitable producer on short or long runs.

In designing this machine tool, George Fischer Limited has put to work the experience of 150 years in the metalworking industry, for this year they celebrate the progress they have made during a century and a half. Started in 1802 by Johann Conrad Fischer, whose motto was "There is 24-carat iron just as there is 24-carat gold", George Fischer Limited has grown to a company which employs about 4,500 and whose plants cover some 125 acres. They are world renowned as manufacturers of malleable iron, electric steel, light alloy, and grey iron castings. Their line of tube fittings embraces some 9,000 items and their line of machines includes metal and woodworking machines as well as foundry and textile equipment.

At this time, when the defensive might of our United States depends to a large degree on a steady increase in our production program, we are glad to be able to announce what we, and the people who have used it, think to be a major contribution to the metalworking art — the NEW BRITAIN +GF+.

CREATED BY
GEORGE FISCHER LIMITED
SCHAFFHAUSEN, SWITZERLAND

Manufactured in the United States by

NEW BRITAIN-GRIDLEY DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

PRESENTING

A COMPLETELY NEW APPROACH TO CONTOUR TURNING

The New Britain **+GF+** Copying Lathe
is the result of fourteen years development
by George Fischer Limited,
world-famous Swiss industrial pioneers.
Many hundreds have been in highly successful use
the world over, for the past eight years.

New Britain has preserved all the important features
which made this copying lathe outstanding, adapting it to the
power input requirements of American industry.
The New Britain **+GF+** is manufactured,
sold and serviced by The New Britain Machine Company.

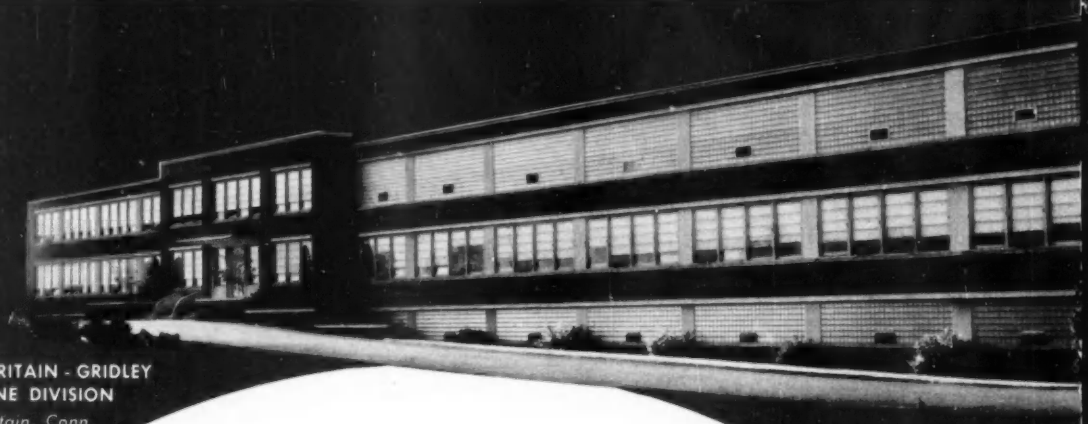
The New Britain +GF+ Copying Lathe makes available a tool equally suitable for long or short runs with • Simplicity of operation • Minimum set-up and change-over time • Reduced handling and checking time • Elimination of expensive tooling

the new

NEW BRITAIN

+GF+

COPYING LATHE



NEW BRITAIN - GRIDLEY
MACHINE DIVISION
New Britain, Conn.

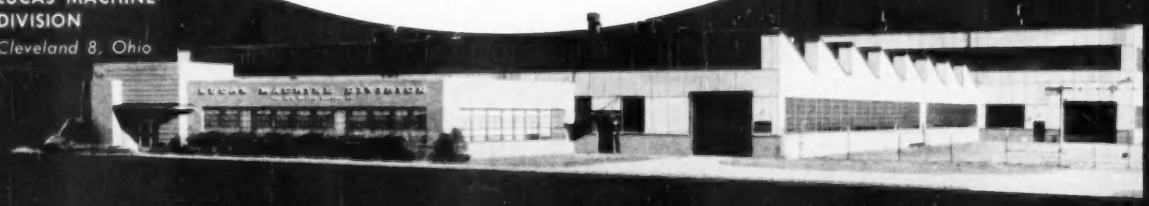
MACHINES *for* MAKING PROGRESS

HALF a century is a brief time for accomplishing the change from "horse-and-buggy" days to our present way of life. The never-ending search for *better methods* is chiefly responsible for this progress.

Throughout the twentieth century many of the improvements in metalworking methods have been contributed by New Britain and Lucas. The machines we have developed play an important part in improving standards of living in time of peace — and defending them in wartime.

THE NEW BRITAIN MACHINE COMPANY

LUCAS MACHINE
DIVISION
Cleveland 8, Ohio



AUTOMATIC BAR MACHINES • AUTOMATIC CHUCKING MACHINES
PRECISION STRAIGHT AND CONTOUR BORING MACHINES
LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES • NEW BRITAIN +GF+ COPYING LATHES

LITHOGRAPHED IN U.S.A.

Precision Forging

(*Continued from page* 35)

ican Wheelabrator, finish-forged in another 1300-ton press, heated by electric rotary furnace—atmosphere-controlled. Cold trim is done on a 125-ton Bliss trim press.

This is followed by heating and quenching, heating and drawing, grinding the root-ends for Rockwell hardness test. Heat-treating operations are performed in Lindberg controlled-atmosphere furnaces.

The last major step in this sequence is a cold restrike in a 2000-lb Ceco hammer. This is followed by Magnaflux inspection and final inspection.

Step 2, mentioned above, employs the Massey Harris Electro-Forge stock gathering machine, illustrated here. This unique piece of equipment is of British origin, made in Canada. Its major features are the hydraulically-actuated ram and the tail stock which carries the gathering die. The billet is guided by means of a clamshell bearing to the right of die and is heated to forging temperature by an inductor at the die. Hydraulic actuation of the ram is automatically controlled as to pressure and rate of feed by means of Vickers controls.

Bucket fabrication is more involved and demands additional steps as well as extreme care in handling because of the greater difficulty in forging the special high temperature resistant alloy. Control of scale becomes more of a problem and cleaning is employed, not only to remove scale, but to afford better detection of surface defects.

Buckets are produced in a different type of equipment, heavier in tonnage for all forging operations, and require six major stages of fabrication as follows:

(1) Wash and cut centerless-ground bar stock to billet length.

(2) Stamp tong-hold end, chamfer upset end. Billets now are heated in a large Tocco induction heating unit, fitted with automatic magazine feed to keep up with the fast cycle of the upsetter. In this case, upsetting is done in a No. 2 Ajax upsetter of standard type, fitted with a four-station die.

(3) Stud-weld tong-hold.

(4) Blocking—The billet is cleaned in an American Wheelabrator. Blocking is done in a 1600-ton Bliss mechanical press, heating for this as well as subsequent operations being done in Holcroft furnaces.

(5) First forge and hot trim—The part goes through the Wheelabrator, then first forge and hot trim in a 1600-ton forging press.

(6) Finish forge and hot trim—The part is Wheelabrated, then finish-forged and hot-trimmed in a 1600-ton press.

Next follow a series of detail operations — restamp root ends, grind flash line, heat-treat and water quench, Tumblast, then the forging is heated and given a hot restrike in one of the 2500-lb Ceco drop hammers.

This is followed by an aging heat treatment, pickling, and Magnaflux Zyglo inspection as well as final inspection.

One of the major projects now under way is the installation of a unique kind of die room. The problem posed here is that the forging materials are difficult to handle and produce rapid erosion of dies. In fact, it is estimated that die life is limited to around 800 to 1000 pieces. Consequently, die making becomes a matter

(*Turn to page* 88, *please*)

Precision Forging

(*Continued from page 87*)

of mass production rather than tool room procedure.

To cope with this situation, Packard has devised a floor plan quite similar to that of volume parts manufacturing, with a straight line flow of subdivided operations, handled by individual mechanics. One advantage of this new approach is that the preliminary preparation of die sets becomes strictly a machine problem, and requires only machine operators rather than die makers. Incidentally, the time involved in making a die is expected to be greatly reduced.

As the installation of equipment continues into the near future, the setup for bucket production is expected to remain substantially as outlined above.

In the case of blades and vanes, however, the conventional methods of forging may be discarded to make way for a revolutionary technique—a unique horizontal Impacter forging machine — developed by Chambersburg Engineering Co. The Impacter, in contrast to conventional forging presses, has two rams of equal mass and energy coming in from opposite directions and returning to their starting position by means of compressed air. The stock is thus worked to the same degree in each die while stock contact is reduced to but a fraction of a second. Uniform working of forging stock, in this technique, is said to produce better quality and superior physical properties.

Major advantages of the Chambersburg Impacter, as outlined by Packard, are:

1. Increased productivity.
2. Improved quality.
3. Lower installation costs.
4. Freedom from vibration due to balancing of dynamic forces.
5. Automatic feed.
6. Increased die life.

This machine will be served by a Tocco induction heating unit of special design, arranged to feed the machine automatically.

You Can See The Difference

ALUMICAST die casting quality assured because of expert scientific control

Here at **ALUMICAST**, we are equipped with the most modern laboratory and production equipment to turn out high quality die castings as well as permanent mold and semi-permanent mold castings of aluminum or magnesium. Castings that are flawless because every step, from ingot to finished casting, is rigidly supervised and is your assurance of expert scientific control second to none. This value, we call "E.S.C.", is vital to your business because it helps make good products better.

If you have a design problem or a production problem in which you believe a die casting or permanent mold casting might be the solution, let our nationally recognized authorities in research, metallurgy, engineering and production give you a helping hand. They will be more than happy to receive and analyze your blueprints and suggest an answer to your problem. No obligation, of course.

No matter where you are located, you will find **ALUMICAST** a quick and reliable source for quality castings. You are cordially invited to consult us relative to your civilian or defense needs. We have sales engineers and representatives in leading cities. If you don't know the name of the one nearest you, write direct to us.

ALUMICAST CORPORATION, 1521 N. Kilpatrick Avenue, Chicago 51, Illinois

ALUMICAST

ALUMINUM and MAGNESIUM PERMANENT MOLD and DIE CASTINGS

"E.S.C." EXPERT SCIENTIFIC CONTROL

1952 Economy Run

(*Continued from page* 51)

another including one torque converter type and the others were equipped with overdrive.

Engineers will be interested in the fact that cars with hydraulic drives were equipped with 3.07 or 3.64 axle ratios while the overdrive cars used 4.10 to 4.55 axle ratios. The two standard transmission cars used a 4.11 and 3.90:1 respectively.

Fourteen eight-cylinder cars were entered of which 11 were of the V-type, and of these all but two were of the valve-in-head type. The trend continues toward V-8 engines of overhead valve design.

Only seven cars used Mobilgas Regular, the balance used Mobilgas Special. Engineers know that to secure best engine performance at high elevations, the spark should be advanced. Because such a large portion of the course was 4000 ft and over, most of the cars were set with an early timing. To keep these cars from pinging excessively at the lower elevations, Mobilgas Special was selected. Had the course not included such elevation extremes, more Mobilgas Regular probably would have been chosen.

We might assume from the Sweepstake's winning Mercury; the second highest ton mpg Lincoln; and the first-in-its-class Ford, that pressure control of ignition timing may have a bearing on proper altitude compensation or bearing on mileage under great varieties of operating conditions. This is at least one of the differences between the first and second place winners, and all other cars except the Fords in Class A.

It is interesting to note that all cars used Mobiloil Arctic Special (SAE 10W) motor oil in the crankcase. Odometer readings for the 1415.4-mile run varied from 1,399.8 to 1,531.0 miles. Only three cars indicated the distance to be less than 1,415.4 miles. All others showed a considerably greater distance traveled, indicating the average car owner should have his odometer calibrated before making any mpg test. Also most speedometers registered high, particularly at over 50 mph.

If the Mobilgas Economy Run results in improved design on the part of car manufacturers, and if the Run brings to the attention of the average motorist the fundamentals of better driving, the savings to the public will be almost staggering. It is estimated that there will be a saving of one and one-half billion gallons of gasoline representing some two hundred million dollars per year reduction in passenger car driving cost. This huge amount is only part of the savings, as maintenance expense will likewise be drastically reduced.

The Mobilgas Economy Run has established a par of economy for the average motorist to strive for. The use of a vacuum gage will be of much help in assisting the average driver, and even experienced drivers, in the judicious control of the foot throttle. If the vacuum gage hand is conscientiously kept in the green, mileage will usually improve two to 10 mpg. The use of good gasoline and lubricants contribute considerably to lower gasoline consumption, and lower maintenance expense will be observed.

Longer wear-life is another *extra* designed into every Fuller Heavy-Duty Transmission.

These gears pictured here, for example, were taken from a Fuller 5-A-920 which logged 750,000 miles . . . 30 times around the world . . . WITHOUT OVERHAUL.

That's why owner Stan Iskra, of Bellevue, Ohio, says:

"After seeing all of the mileage which I have gotten out of this transmission, I wouldn't think of buying another truck that did not have a Fuller Transmission."

This particular tractor was in service hauling steel from Pittsburgh to Detroit and nearby points, part of the time pulling a double-dolly train. But its *longer* wear-life record could have been posted in any kind of heavy-duty hauling—off-highway or on—because there is a Fuller Transmission to match every "road and load condition." More than 101 models, in fact.

Choose a Fuller Transmission or Auxiliary for your rig. You'll find, like Stan Iskra, that it pays in more tonnage hauled at the end of the year for far less, particularly in maintenance.

Unretouched photographs above show the original gears, just as they came out of Stan Iskra's 5-A-920 Fuller Transmission, after millions upon millions of punishing contacts.

Fuller TRANSMISSIONS ®

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

Testing Electrical Units

(*Continued from page* 49)

tower, is recorded in ohms on the meter. Cold coils are heated before testing by turning the switch to coil heat position with the test leads properly attached.

Fuel level, oil pressure, temperature and charge indicator assemblies are the instruments found on the instrument board of the vehicle. With tester leads of the third panel from right, attached, the fuel level, oil pressure and temperature indicator gages are tested for short circuits and calibration of the gages. The charge indicator is tested to see that it goes through both charge and discharge ranges of the indicator. The meters and switches on the panel are used for making tests and showing results.

The last panel on the left, in Fig. 2, is for testing the engine unit of the oil pressure gage. It is mounted in the fixture on the lower part of the panel. The meter in the center shows air pressure used in testing. The double meter at the top shows a percentage reading, as specified by the manufacturer, for indicating the calibration of the engine unit of the oil gage. The valves are used to test this unit under two sets of air pressures.

All regulators must be brought to operating temperatures before testing. The heating unit, Fig. 3, has three trays for holding three regulators. The regulators are placed on electrical contacts in the trays, and the trays pushed in, locking closed. The timers, one under each tray, are set for five minutes for cold regulators. The switch on the right is turned to a position from 65 to 110, depending on the amount of heat required. Regulators are heated internally by passing current through the coils. External heating of the regulator is by means of the switch-controlled heating unit. When the time cycle is completed, the tray pops out automatically.

Protect Costly Equipment With TDA BRAKES

When you're lifting vital defense material that's both heavy and breakable, it's only good sense to do the job with equipment that's tested and proved in every respect! That's why so many manufacturers of rubber-tired cranes used in this type of work have standardized on TDA Brakes for all their vehicles. For example, the Thew Shovel Company of Lorain, Ohio—makers of the crane shown here loading aircraft engines essential to America's defense—has used TDA Brakes exclusively since it built the very first rubber-tired crane in 1918. And throughout the nation, there are more TDA Brakes in actual use on heavy-duty commercial vehicles than any other make! TDA is America's greatest name in brakes!

TIMKEN *Detroit* **BRAKES**

TDA BRAKE DIVISION
THE TIMKEN-DETROIT AXLE COMPANY
ASHTABULA, OHIO

The Accepted T D A Co Standard
TRADE MARK REGISTERED

WHATEVER YOUR BRAKING PROBLEM—TAKE IT TO TDA!

TDA BRAKE DIVISION—DEPT. 50, ASHTABULA, OHIO

Please mail brake information on these applications:

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

Friction material problem?

R/M BELONGS IN YOUR PICTURE!

"STOP-AND-GO" IS OUR BUSINESS!

MAYBE YOU'RE not in the road machinery business . . . but *whatever* your problems with brakes and clutches, RAYBESTOS-MANHATTAN can engineer specialized friction materials with the same fine results enjoyed for years by leading makers of tractors, bulldozers, graders and shovels.

Equally impressive is the R/M leadership in the automotive industry. More cars, trucks and buses use R/M brake linings, clutch facings, and automatic transmission friction material parts than any other make. This R/M leadership extends to scores of other industries, ranging from office equipment to mining machinery.

You're on the right track when you call in the R/M man. He's ready to help you . . . and he can work from samples, from designs on paper, or from figures on horsepower development combined with desired performance characteristics.

The opening of our new Wabash Division, Crawfordsville, Ind., provides expanded facilities for the manufacture of
SINTERED METAL FRICTION MATERIALS

R M
FIRST IN FRICTION

RAYBESTOS-MANHATTAN, INC.
EQUIPMENT SALES DIVISION 445 Lake Shore Drive, Chicago 11, Ill.
Detroit 2 Cleveland 14 Los Angeles 11

Factories: Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C. Crawfordsville, Ind. Canadian Raybestos Co. Ltd., Peterborough, Ont.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Industrial Rubber Products • Rubber Covered Equipment • Mechanical Packings • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls


R/M

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to April 23 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the May 15 issue, page 53, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration between April 23 and May 13.

Included in this latest tabulation, 9579 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $18,217,065,672. These figures are exclusive of cases that are up for later review but included in this list—in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

— A —

ACF-Brill Motors Co., Berkeley, Calif.
Power plants—$34,159 (65)

Aero-Coupling Corp., Burbank, Calif.
Aircraft parts—$16,110 (65)

Aircraft Engineering Products, Inc., Clifton, N. J.
Aircraft hydraulic cylinders—$18,651 (80)

American Tool Works, Hartford, Conn.
Aircraft parts—$62,113 (80)

The Apex Tool Co., Inc., Bridgeport, Conn.
Aircraft parts—$42,977 (70)

— B —

Beech Aircraft Corp., Wichita, Kans.
Aircraft parts—$1,130,500 (65)

Bendix Aviation Corp., Teterboro, N. J.
Aircraft parts—$32,200 (65)

Borg-Warner Corp., Chicago, Ill.
Ordnance—$43,500 (65)

Bower Rolling Bearing Co., Detroit, Mich.
Bearings for aircraft—$1,092,209 (65)

Byers Machine Co., Ravenna, Ohio.
Earth moving equipment—$98,658 (50)

— C —

Calif. Stamping & Mfg. Co., Los Angeles, Calif.
Aircraft parts—$13,350 (65)

Carlisle Corp., Carlisle, Pa.
Tire tubes—$19,213 (65)

The J. C. Carter Co., Pasadena, Calif.
Aircraft parts—$11,511 (70)

Caterpillar Tractor Co., E. Peoria, Ill.
Earth moving equipment—$1,422,941 (50)

Consolidated Vultee Aircraft Corp., San Diego, Calif.
Airplanes & parts—$1,468,495 (65)

Coombs Motor Co., Watertown, Mass.
Aircraft parts—$11,398 (80)

Curtiss-Wright Corp., Carlstadt, N. J.
Aircraft parts—$466,030 (65)

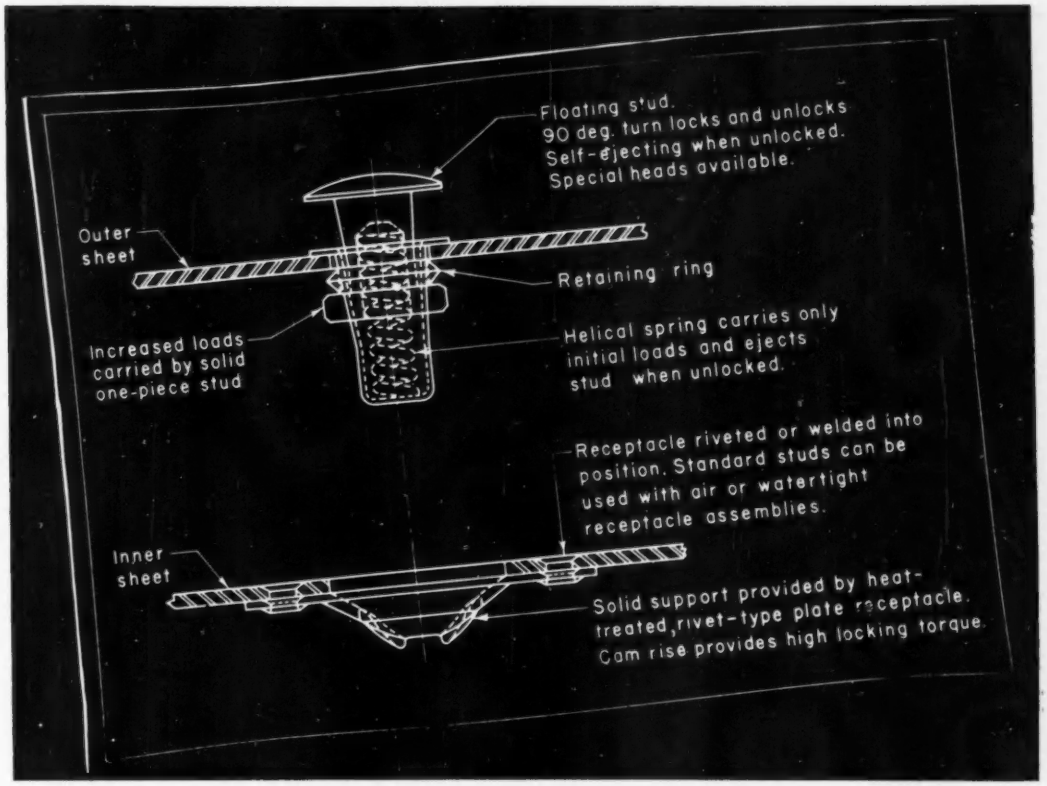
— E —

Elbeeco, Inc., Jackson, Mich.
Aircraft parts—$18,327 (50)

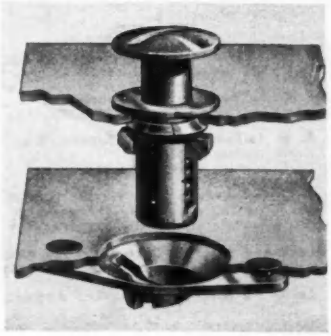
The Engelberg Huller Co., Inc., Syracuse, N. Y.
Aircraft parts—$6,895 (70)

Ex-Cell-O Corp., Highland Park, Mich.
Aircraft parts—$107,518 (65)

(*Turn to page 98, please*)



HOW QUICK-LOCK CUTS FASTENING COSTS



A glance at the drawing shows the advantages of QUICK-LOCK's efficient design. QUICK-LOCK speeds up the mounting and demounting of detachable panels, works equally well on curved or straight sheets.

QUICK-LOCK is adaptable to many different fastening applications in the aircraft, automotive, railroad, electrical and appliance fields. Let Simmons engineers help you cut assembly costs. Write for literature and samples today.

SIMMONS FASTENER CORPORATION · 1749 No. Broadway, Albany 1, New York

Simmons

QUICK-LOCK
SPRING-LOCK
ROTO-LOCK
LINK-LOCK

FASTENERS THAT IMPROVE PRODUCTS AND REDUCE ASSEMBLY COSTS

(*Continued from page 96*)

— G —

General Motors Corp., Detroit, Mich.
Ordnance—$798,120 (50)

The General Tire & Rubber Co., Bowling Green, Ohio.
Aircraft parts—$612,767 (65)

G. M. Giannini Co., Inc., Pasadena, Cal.
Aircraft instruments—$4,449 (65)

Gibbon Mfg. & Research Corp., Janesville, Wis.
Aircraft and ordnance—$59,843 (70)

Goodyear Aircraft Corp., Akron, Ohio.
Aircraft parts—$307,682 (65)

Goodyear Aircraft Corp., Litchfield Park, Ariz.
Aircraft parts—$919,118 (65)

Goodyear Tire & Rubber Co. of Alabama, Gadsden, Ala.
Military tires—$8,485,330 (30)

— H —

Hagan Corp., Orrville, Ohio.
Aircraft products—$230,000 (70)
Aircraft products—$80,000 (70)

Hallett Mfg. Co., Inglewood, Calif.
Diesel generating sets—$129,992 (65)

Halterman, Stark & Co., Chula Vista, Calif.
Aircraft parts—$34,158 (80)

Hobbs Mfg. Co., Tarrant County, Tex.
Truck trailers & truck bodies—$58,069 (65)

— K —

Kenworth Motor Truck Corp., Seattle, Wash.
Testing and inspection of trucks—$46,000 (65)

Kenyon Instrument Co., Inc., Huntington Station, L. I., N. Y.
Control assemblies for aircraft—$4,715 (70)

— L —

R. G. LeTourneau, Inc., Longview, Tex.
Earth moving equipment—$274,442 (50)

R. G. LeTourneau, Inc., Peoria, Ill.
Earth moving equipment—$481,473 (50)

R. G. LeTourneau, Inc., Toccoa, Ga.
Earth moving equipment—$24,523 (50)
Earth moving equipment—$70,014 (50)

R. G. LeTourneau, Inc., Vicksburg, Miss.
Earth moving equipment—$15,940 (50)
Earth moving equipment—$117,860 (50)

Lockheed Aircraft Corp., Burbank, Cal.
Aircraft and spare parts—$2,874,555 (65)

Lockheed Aircraft Corp., Los Angeles, Calif.
Military aircraft—$839,361 (65)

Lockheed Aircraft Service, Inc., Burbank, Calif.
Military aircraft—$44,671 (65)

— M —

The Glenn L. Martin Co., Middle River, Md.
Aircraft spare parts—$521,958 (70)

Monarch Governor Co., Detroit, Mich.
Ordnance—$39,570 (80)

(*Turn to page 102, please*)

TEFLON is

a trademark of E. I. DuPont Co. for polytetrafluoroethylene. It is supplied by C-D-F in tapes and sheets, both plain and fibre glass cloth supported.

HEAT RESISTANT
Teflon may be used continuously at 200°C. (392°F.), or for short periods at 250°C. (482°F.). Meets A.I.E.E. Standards for Class H electrical insulation.

MOISTURE RESISTANT
Teflon products have practically zero water absorption and are unaffected by fungus, humidity and temperature changes. It remains pliable at —87.5°C. (—100°F.).

ARC RESISTANT
Teflon will not carbonize, but rather will vaporize. When the arc is extinguished, full insulation is restored.

CHEMICAL RESISTANT
Teflon is the most inert of all commercial thermoplastics and is not affected by any known solvent.

THAT'S WHY C-D-F TEFLON TAPES AND SHEETS CAN OFFER THESE BIG ADVANTAGES

FOR LINING SLOTS C-D-F sheets of fibre glass cloth supported Teflon can be cold-formed into easily loaded slot liners. Teflon is naturally slippery smooth, with plenty of "snap back." High in dielectric strength, liners are rated Class H insulation.

FOR WRAPPING CABLES C-D-F Teflon tapes are tough, strong, and stretchable. Teflon can be supplied unsupported, or combined with fibre glass fabrics in a variety of widths and thicknesses. It is suitable for winding around sharp bends or odd shapes.

FOR CHEMICAL AND MECHANICAL USES Remember, Teflon is non-adhesive and chemically inert. Bakers, food packagers, and pump manufacturers use it. For applications requiring extreme electrical insulation stability, high temperature or resistance to corrosion, C-D-F unsupported and fibre glass cloth supported products can do a job for you.

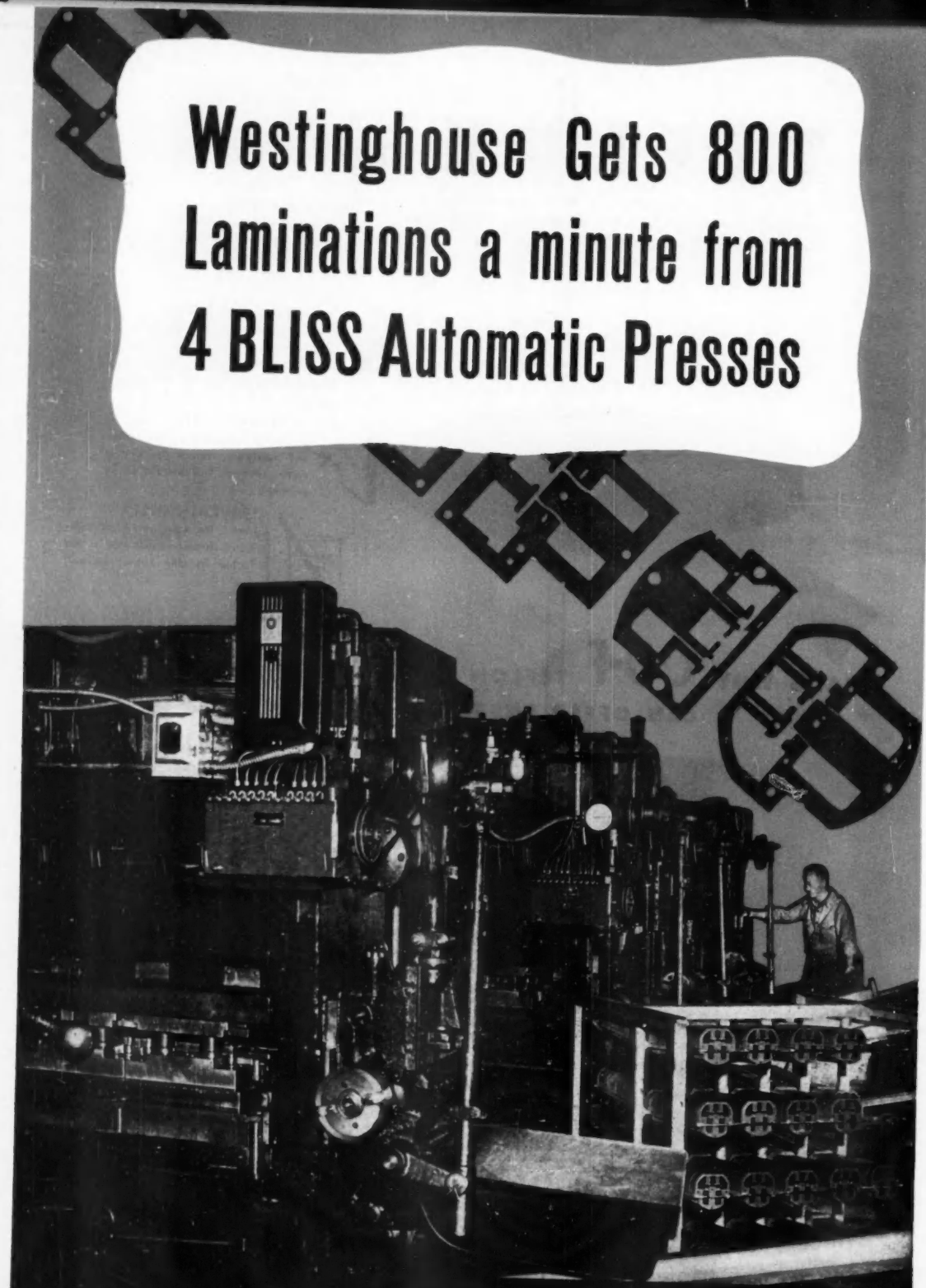
C-D-F's work with Teflon is really rolling! New applications are being developed daily in our laboratories by specialists who are devoting their entire time to improving and developing new Teflon products. Start talking Teflon with the man from C-D-F (sales offices in principal cities)—he's a good man to know!

CDF

Continental-Diamond Fibre Company

NEWARK 2, DELAWARE

Westinghouse Gets 800 Laminations a minute from 4 BLISS Automatic Presses



Bliss Automatic Lamination line of four No. 645 High-Production Presses, operating at speeds in excess of 200 strokes per minute, produces meter laminations at the Westinghouse, Newark, N. J., plant.

Meter Division at Newark operates battery through two shifts daily

To keep pace with stepped-up meter production, Westinghouse relies on a battery of four Bliss High-Production Presses for a major portion of its lamination stampings.

Production is fully automatic: 0.017 in. silicon steel feeds from a Bliss-built coil cradle, through a double-roll feed, into the Westinghouse-designed six-station die. Stamped laminations stack into a magazine; scrap is pulled through and automatically trimmed...all at a continuous day-in, day-out operating rate of 200 spm.

The first of these four Bliss No. 645 Presses was installed in 1929; the newest has been on the job less than a year. These are but four of 80 Bliss presses on the job at the Westinghouse Meter Division.

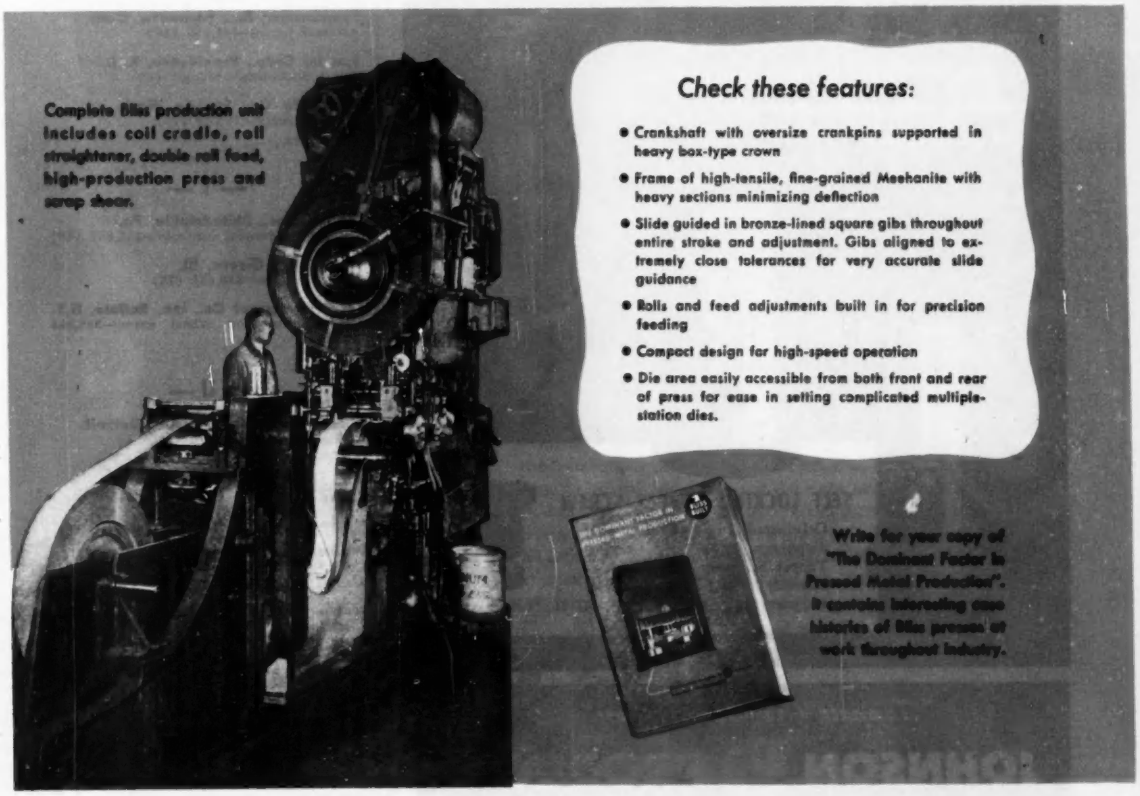
When you consult Bliss engineers, you will find Bliss has the right press for almost every metal-forming operation. That's because Bliss builds the most complete range of pressed-metal machinery available anywhere. To see how Bliss experience has worked for industry, write for "The Dominant Factor," our 32-page brochure.

E. W. BLISS COMPANY, CANTON, OHIO

E. W. Bliss (England) Ltd., Derby, England

E. W. Bliss Company (Paris), St. Ouen sur Seine, France

Presses, Rolling Mills, Special Machinery



From a single press for a given job...to a complete press room... *It's Bliss!*

(Continued from page 98)

Mueller Co., Los Angeles, Calif.
Aircraft parts—$57,839 (75)

—N—

National Water Lift Co., Kalamazoo, Mich.
Aircraft parts—$3,072 (70)

New Process Gear Corp., Auburn, N. Y.
Ordnance—$225,508 (65)

New Process Gear Corp., Syracuse N. Y.
Ordnance & aircraft parts—$2,002,147 (65)
Military truck parts—$461,588 (55)

The Nippert Electric Products Co., Columbus, Ohio.
Aircraft parts—$65,280 (70)

—O—

Orenduff & Kappel, Inc., Westbury, L. I., N. Y.
Aircraft parts—$361,425 (70)

—P—

Perfect Circle Corp., Richmond, Ind.
Ordnance—$75,000 (65)

Perfect Circle Corp., Tipton, Ind.
Piston rings—$417,000 (65)

Perfex Corp., Milwaukee, Wisc.
Aircraft parts—$11,866 (70)
Aircraft parts—$9,599 (65)

Precision Gears & Products, Inc., Paterson, N. J.
Aircraft parts—$68,250 (65)

—R—

Raybestos-Manhattan, Inc., Crawfordsville, Ind.
Ordnance—$28,000 (70)

Reda Pump Co., Bartlesville, Okla.
Aircraft parts—$122,332 (70)
Hydraulic cylinders for aircraft—$3,336 (70)

Rex-Hide Inc., East Brady, Pa.
Flaps for truck tires—$60,000 (50)

Robertshaw-Fulton Controls Co., Youngwood, Pa.
Aircraft instruments—$226,697 (70)

Rohr Aircraft Corp., Riverside, Calif.
Aircraft parts—$2,013,283 (65)

Rudolph Wurlitzer Co., No. Tonawanda, N. Y.
Aircraft parts—$44,710 (75)

—S—

Schulz Tool & Mfg. Co., San Gabriel, Calif.
Aircraft parts—$17,635 (65)

Shakespeare Co., Kalamazoo, Mich.
Aircraft parts—$100,000 (65)

Sierra Tool & Mfg. Co., Glendale, Calif.
Aircraft parts—$47,325 (80)

Speedmilling Co., Pasadena, Calif.
Aircraft parts—$41,335 (80)

Speidel Corp., Providence, R. I.
Climb indicators—$75,000 (65)

Sulak Mfg. Co., Seattle, Wash.
Aircraft parts—$8,609 (75)

—T—

Teleflex, Inc., Philadelphia, Pa.
Mechanical remote controls—$52,687 (70)

Thor Corp., Cicero, Ill.
Aircraft parts—$48,485 (75)

Truck Equipment Co., Inc., Buffalo, N.Y.
Track suspension wheel arms—$41,950 (80)

—U—

United States Rubber Co., Detroit, Mich.
Military tires—$65,289 (65)

—W—

Watson Mfg. Co., Inc., Jamestown, N. Y.
Aircraft parts—$79,369 (65)

Westport Development & Mfg. Co., Inc., Milford, Conn.
Aircraft parts—$13,093 (75)

The White Motor Co., Cleveland, Ohio.
Ordnance—407,734 (65)

Wyoma Welding Co., Lynn, Mass.
Aircraft parts—$6,950 (65)

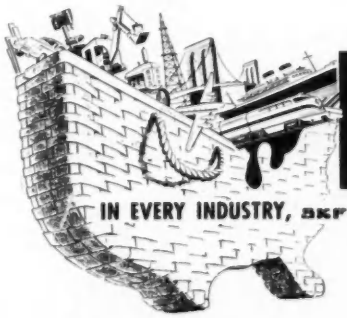
Additional wing to SKF's Research Laboratory.

READY... WILLING... AND ABLE

In long association with the aircraft industry, SKF has worked closely with power plant engineers in designing and manufacturing anti-friction bearings with stamina to withstand the tremendous punishment dealt them by supersonic aircraft. To continue to help all industries put the right bearing in the right place, SKF has doubled its laboratory area. SKF's expanded research facilities are another step in turning bearing problems into bearing progress! It's all a part of SKF's relentless program of working for ever-higher quality standards—setting the pace for bearing manufacturing.

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.— *manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*

7335



SKF®
BALL AND ROLLER BEARINGS

IN EVERY INDUSTRY, SKF Puts The Right Bearing In The Right Place

Problem...

GETTING GREATER FLEXIBILITY, MAXIMUM UTILIZATION OF SCARCE STEEL WITH SMALLER INVENTORIES....

Industrial building corridor shows the variety of panel widths required. Note ripple-free flatness of panels. Hauserman can cut these from one width of coil stock.

Neat, trim business office of Hauserman panels. Note clean window lines and wainscoting. Hauserman now can produce any necessary width from wide coils, eliminating heavy steel inventories.

The E. F. Hauserman Company, Cleveland, Ohio, is the world's largest manufacturer of movable steel partitions and wainscot panels. Their operation demanded flat steel of innumerable dimensions, trimmed and leveled to precision flatness. As the sheets came from the steel mills they were stretcher leveled to commercial tolerances, or a buckle of not over ¼" high. But in the manufacturing of Hauserman partitions, they insisted on the maximum tolerance of 1/16", or practically dead flat.

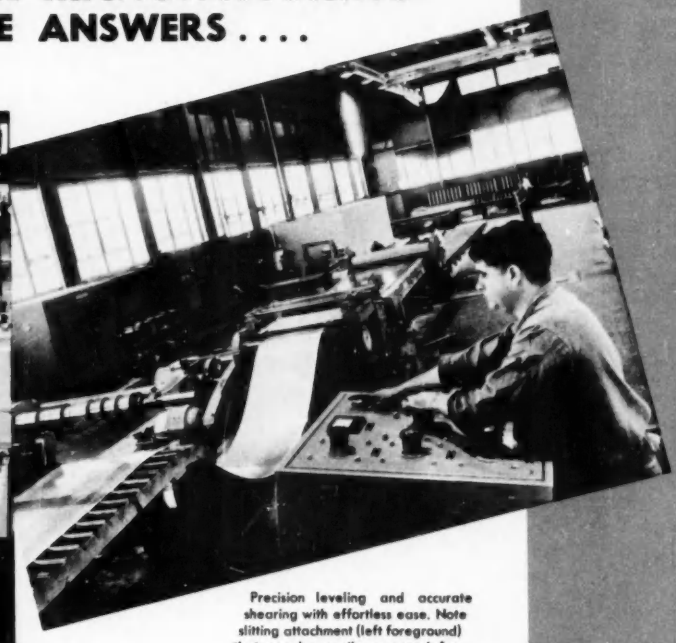
The steel mills had met Hauserman's flatness requirements, but it was costly for them as well as Hauserman. Steel producers encouraged Hauserman to look into the possibilities of providing their own leveling facilities.

Add to this the fact that Hauserman's operations required sheets of many sizes in lengths from 3 to 12 feet and widths from 1 to 5 feet. In using mill sheets Hauserman had either to stockpile multiple lengths and widths to obtain a flexible inventory or to stock larger sized sheets and trim them as they were needed — which resulted in unnecessary waste.

Solution...

WEAN COMBINED SLITTING, SHEARING AND LEVELING SET-UP FOR MANUFACTURING PLANTS PROVIDES THE ANSWERS....

Receiving end of Wean shear line shows compact, easily maintained arrangement. Elevated control stand permits full view of all operations.



Precision leveling and accurate shearing with effortless ease. Note slitting attachment (left foreground) that can be easily engaged for the production of narrow strip.

Encouraged by basic steel producers Hauserman engineers decided to do their own slitting, shearing and leveling. Working with Wean Equipment Corporation's engineers a complete operation was designed and built that enables Hauserman to buy commercial coil stock in a minimum of widths, shear to desired dimensions, level as required — to maintain complete stocks with a minimum inventory.

The first station on the Wean line is an uncoiler from which the stock passes into a gang slitter where it is edge trimmed and slit to desired widths. The steel may then be recoiled and stored. When sheets are desired, the stock by-passes the recoiler and enters the flying shear to be cut in sheet lengths. Semi-automatic roller conveyors enable Hauserman to move the steel to storage or to send it through the leveling section of the line where the roller leveler actually delivers improved flatness over the stretcher leveled stock formerly used.

THE ANSWER IS RESULTS . . .

Wean maintains perhaps the most experienced staff of special machinery and equipment engineers and construction craftsmen in the nation.

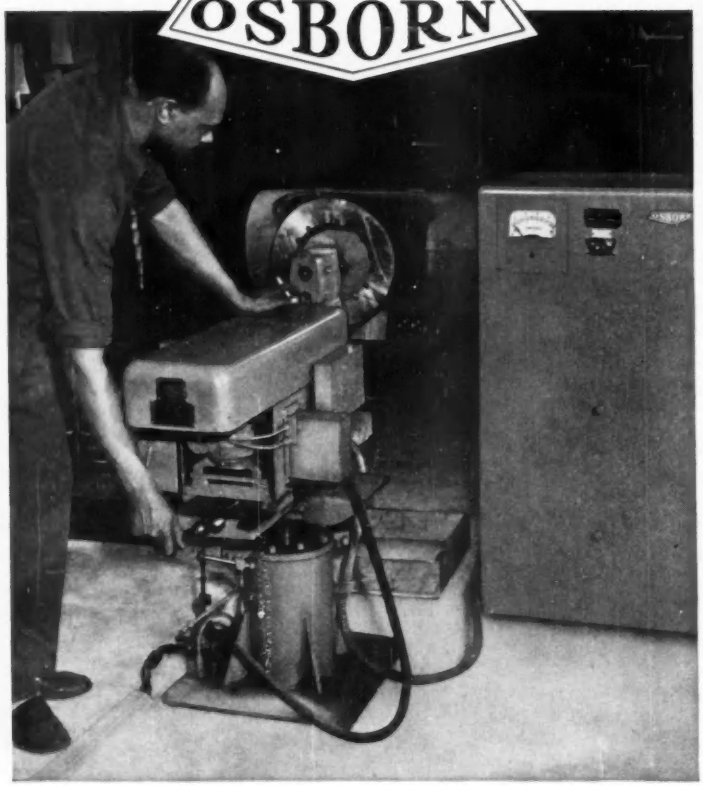
Whatever your special machinery problem, your engineers can have this result-getting combination by contacting Wean Equipment Corp., 22800 Lakeland Boulevard, Cleveland, Ohio.

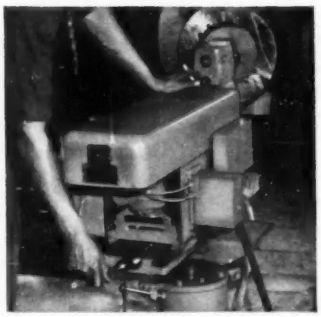
MACHINERY TODAY IS THE BUSINESS OF THE

Wean EQUIPMENT CORPORATION

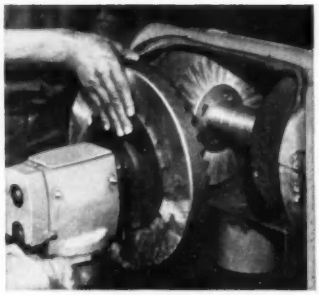
Cleveland, Ohio

OSBORN





SET-UP IS SIMPLE. The machine is versatile. If your production involves small runs of many different types and sizes of gears and similar parts, you can specify machine settings for each part and operator can make set-up changes easily and quickly for maximum daily output. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.



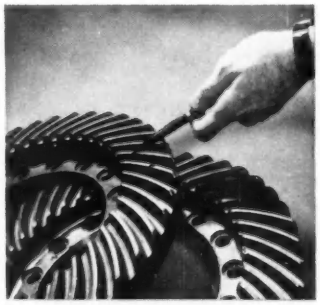
OPERATION IS SPEEDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear teeth makes contact with the brushes. To assure fast, positive action on each piece brushed, an automatic control reverses the direction of brush rotation on every cycle of operation.

Deburrs gears 15 times faster at the push of a button!

Want to break a big bottleneck in the production of gears and similar parts? Manufacturers are doing just that with the Osborn Work Holder Brushing Lathe.

In the plant of the White Motor Company, Truck Division, Cleveland, Ohio, this Osborn machine deburrs and finishes gear teeth 1570% faster than the old method. This was done formerly with a portable grinder . . . a tedious operation that took 25 minutes for the 14-inch hypoid gears shown. Now, an operator simply places the gear in the Osborn Work Holder Brushing Lathe, pushes a button and the machine does the job automatically. Floor-to-floor time is only 1½ minutes! Uniformity of finish results in additional time savings in matching and assembly of gears.

It will pay you to investigate this high-speed, high-quality machine for deburring and finishing gears on a production basis. Call your **O**sborn **B**rushing **A**nalyst today or write *The Osborn Manufacturing Company, Dept. 741, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear tooth has smooth, uniform rounded edges. Surfaces are blended.

INVESTIGATE IT TODAY

for *your* problems. Users report time savings ranging from 20% to 1570% with the Osborn Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

Business Pulse

(Continued from page 70)

Price declines are also reported in silver and cadmium and even in some types of steel. In the field of consumer goods, reductions have occurred in prices of carpets, electric refrigerators, and freezers.

These price recessions are the outgrowth of an easing supply situation that also finds reflection in a further relaxation of Governmental controls. At the end of April it was announced that allocations of steel, copper, and aluminum to small manufacturers for the third quarter of the year would be approximately doubled. All controls on lead, bismuth, cadmium, and antimony have been removed, and nearly all controls on zinc have been eased. The relaxation of restrictions on the building of entertainment and recreation facilities and the increases in amounts of steel and aluminum made available for residential and commercial building in the second half of this year have brought the construction industry closer to a normal supply basis than it has been in almost two years.

Steel and Copper Outlook

Steel producers are reported to be of the opinion that supply and demand conditions are now approaching a balance and that production may decline below capacity levels before the end of the year. An industry advisory group has recommended to the Government that materials allocations be further liberalized by the fourth quarter. This group has suggested that priority ratings be continued for military and atomic uses, with other consumers free to obtain supplies in the open market.

While the availability of many metals appears to be increasing, copper remains in very short supply. This metal, which has been among the scarcest of all industrial raw materials since the inception of the rearmament program, assumed an even more dubious outlook early in May when Chile denounced her 1951 agreement with the United States copper companies. Chile's intent in abrogating the agreement was believed to be to renegotiate for a higher contract price.

It appeared for a while that Chilean supplies would be cut off for an indefinite period, but the outlook changed on May 21 when the Defense

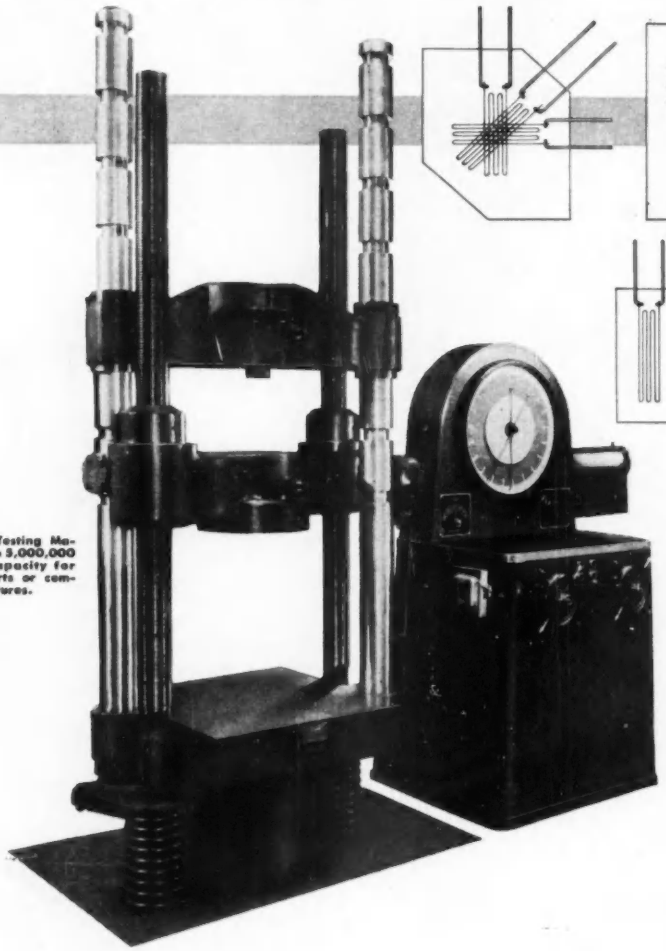
(Turn to page 110, please)

Here's every testing machine

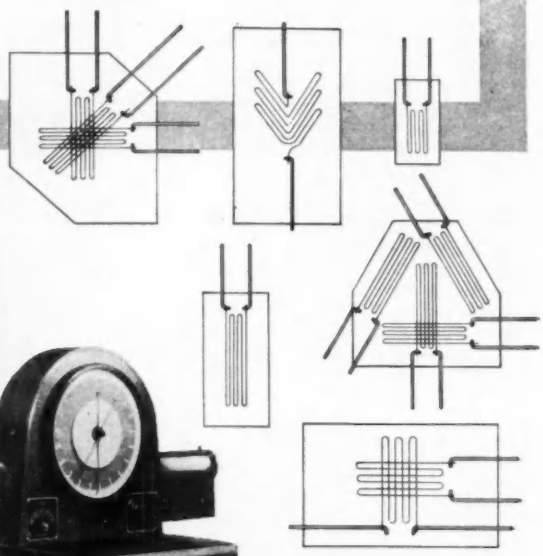
to *improve* the mechanical design

If you are now redesigning your products—or in the midst of a continuing program of improvement—you have a real need for one or all of these Baldwin testing devices. Designed by names famous wherever material testing is done, each is a versatile scientific tool that will enable you to anticipate the reaction of materials under hard usage—and design accordingly.

Whether you are setting up a complete new testing laboratory or merely expanding your present facilities, Baldwin can supply the equipment—standard or special.



Universal Testing Machines up to 5,000,000 pounds capacity for testing parts or complete structures.

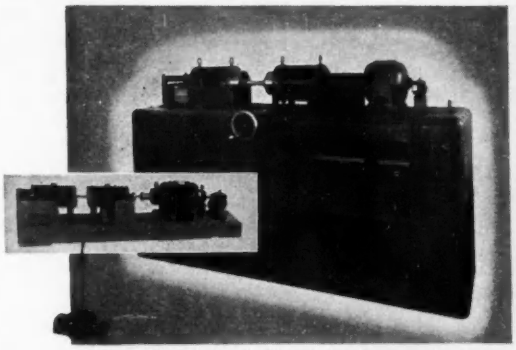


Baldwin SR-4 strain gages are used not only to measure static or slowly varying strains, but also to measure strains resulting from impact loads, and dynamic strains up to 50,000 cycles per second.

BALDWIN · BLH · LIMA-HAMILTON

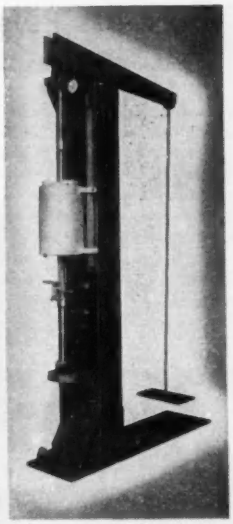
you need

of your product

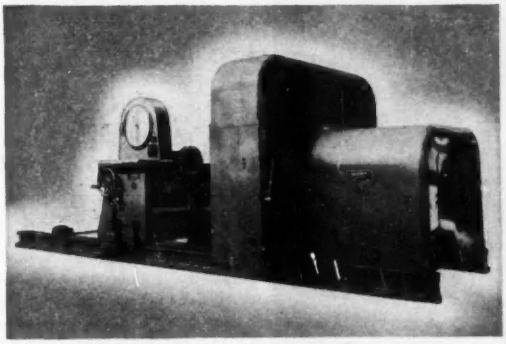


Rotating Beam Fatigue Machines for bending moments up to 10,000 inch-pounds.

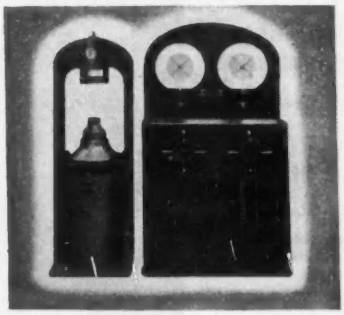
Pendulum-type Impact Machines in combination capacities from 1 foot-pound up to 240 foot-pounds.



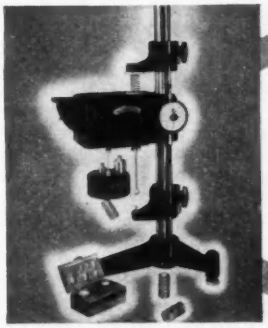
High-temperature Creep Testing Machines for creep rupture, relaxation, constant strain rate, etc.



Torsion Testers of all sizes, capacities, speeds to meet individual specifications.



Compression Testers for loads up to 300,000 pounds for concrete cylinders and building blocks. Other machines for cement, mortars, soil with readability down to 5 pounds per dial division.

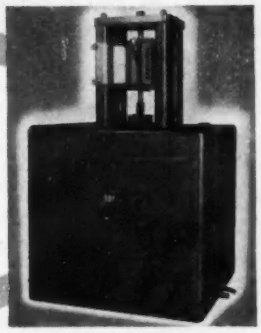


Baldwin-Hunter Spring Testers for fast, accurate testing of compression and extension springs with loads up to 10 pounds.

BRAINS on LOAN!

We never lose interest once you've purchased Baldwin testing equipment. Instead, we have a continuing interest in helping you extend the range of usefulness of your machines—in helping you solve unusual testing problems.

At your service are the brains of men who invented these machines and helped make Baldwin America's Testing Headquarters. And always, the Baldwin Field Service Staff is available to regularly calibrate, adjust and maintain your Baldwin machines at the peak of accuracy.



Fatigue and Simulated Service Testing Machines—the most complete line ever offered, from 25 pound to 20,000 pound capacity machines.

BALDWIN-LIMA-HAMILTON

EDDYSTONE DIVISION, BALDWIN-LIMA-HAMILTON CORPORATION, PHILADELPHIA 42, PENNSYLVANIA

In Canada: Peacock Bros., Ltd., Montreal, Quebec

Business Pulse

(Continued from page 107)

Mobilizer ruled that importers might buy copper abroad at open-market prices and pass on 80 per cent of the increase in cost to domestic consumers in higher prices. To offset the curtailment of supply caused by the temporary suspension of imports, the President authorized withdrawals of 22,000 tons of copper from the nation's strategic stockpile.

Budget Cuts Seem Likely

At this writing Congress has not yet taken final action on either the foreign-aid or the military appropriation bills. It appears likely, however, that the sums finally voted will be appreciably less than the amounts requested by the President in his January budget message. All through the debate on these measures, Congress has been torn between two conflicting viewpoints.

On the one hand, Administration officials have taken the position that programs which they have proposed have been stripped of all but bare essentials and that, therefore, any reductions would endanger national security. In view of the enormity and complexity of the budget requests, it has been extremely difficult for Congressmen and the public to weigh the validity of this contention.

Over against the Administration's assertion, however, there is a strong body of opinion which holds that the large prospective deficit for fiscal 1953 (according to the President's estimate, $14.4 billion) is itself a serious menace to security, since it threatens a renewal of inflation and financial disorder.

Thus far, Congress appears to have been more strongly impressed by the latter consideration, and Congressional committees have trimmed substantial amounts from original requests. On the basis of present indications, the excess of expenditures over receipts may be held to half the figure anticipated by Mr. Truman. Many observers have stressed the apparent need for a staff of experts attached to Congress to dissect budget requests and ferret out duplications and waste.

New Registration System Set for French Vehicles

The adoption of a new system of registration has made it possible for the French government to determine the exact number of trucks and other utility vehicles at present in service. Trucks having a load capacity of 2000 lb or more number 445,360. Buses and coaches total 22,179, aside from the 2470 buses in Paris.

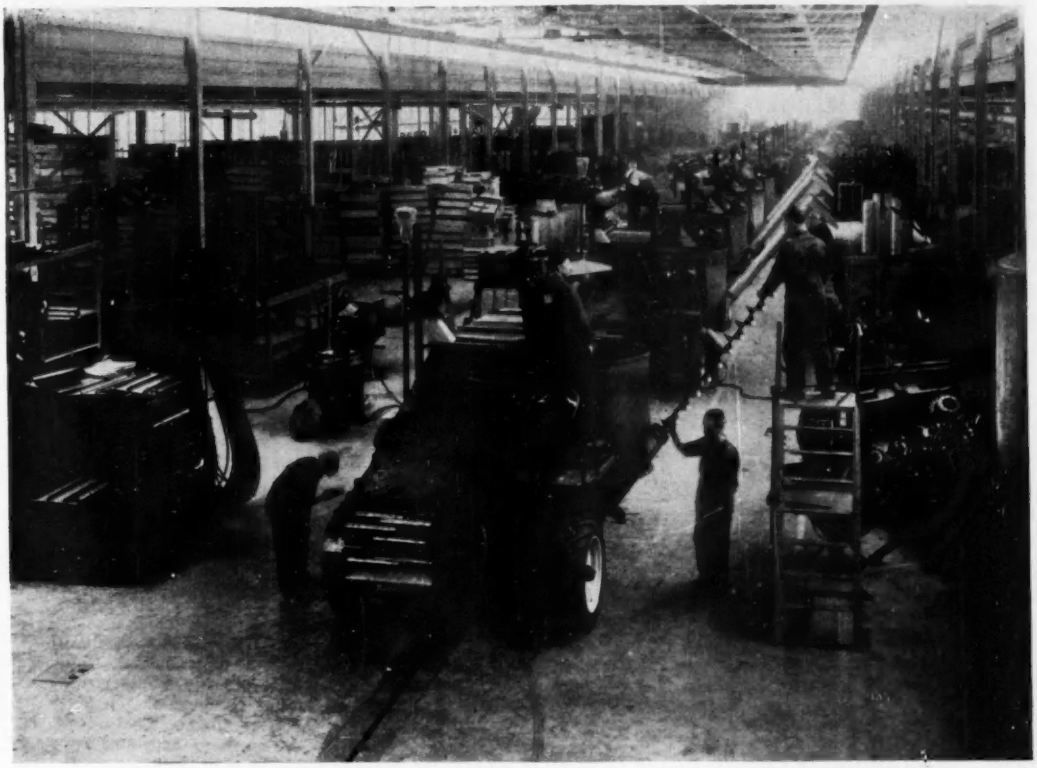
Special vehicles total 12,853, while others, such as bulldozers, concrete layers, snow removers, etc., total 7495. Agricultural and forestry tractors used on the highway and requiring registration, number 117,357. In addition, it is estimated that there are about 43,000 tractors which do not require registration.

The figure for trailers and semitrailers is 58,220. Power-driven vehicles of more than 2000 lb capacity total more than 600,000.

Alcoa Installs Huge Press From One of Krupp Plants

A 15,000-ton press, brought to the U. S. from one of the Krupp plants in Germany after World War II, is being installed by Aluminum Co. of America. In one huge piece it reportedly can bite out to exceedingly accurate dimensions the whole wing spar of a jet plane.

no ONE chain serves every purpose



A 545-foot-long Link-Belt endless chain conveyor, using Link-Belt SS-1410 steel chain, on a combine-harvester assembly line. Speed is adjustable for either variable speed continuous duty or fixed speed intermittent operation.

LINK-BELT offers the RIGHT chain for every job . . . engineered to meet your requirements

Typical chains from the complete Link-Belt line

Class H Pintle chain—excellent for conveyors that slide, because of broad wearing surfaces.

Class C combination chain—popular, durable, low cost design for elevators, conveyors.

Class SS bushed roller chain with offset sidebars—for heavy drive service at moderate speeds.

Link-Belt "Flint-Rim" cast sprockets, give extra long life. Cast steel sprockets are also available for most severe service.

Link-Belt offers no single "cure-all" chain to handle every job. From the most complete line of chains and sprockets—we can recommend the best type to fit your particular requirements—cast, combination, forged and fabricated steel, roller or silent. So, whatever your chain problems, large or small, Link-Belt engineers will work with you or your consultants to help solve them.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.

12,442-D

LINK-BELT

CHAINS AND SPROCKETS

MEN *in the* NEWS

(*Continued from page* 25)

Cummins Engine Co., Inc.—**Charles C. Sons** is now acting general service manager.

Consolidated Engineering Corp.—**Victor J. Pollock** has joined the organization as assistant to the treasurer.

E. I. du Pont de Nemours & Co., Inc.—**Walter Mees** heads the new petroleum chemicals export sales section of the Organic Chemicals Dept.

Nash-Kelvinator Corp., Nash Motors Div.—**Earl F. Warner** has been chosen factory manager of the El Segundo, Calif., plant.

Cummins Diesel Export Corp.—**Harold H. Hall** recently became general manager.

Bakelite Co.—**George C. Miller** has been named vice president in charge of sales, and **Clinton W. Blount** is now vice president and general sales manager.

Marquardt Aircraft Co.—**Clark B. Millikan** and **Clarence E. Unterberg** were recently made directors.

National Acme Co.—**Harold J. Smith** has been appointed manager of the Chicago district.

Ray-O-Vac Co.—**J. A. McIlnay** is now vice president in charge of sales.

National Malleable and Steel Castings Co., Industrial Div.—**Robert D. Sowers** was recently made sales manager.

Detroit Broach Co.—**Chester L. Shaw** is now works manager.

Allied Products Corp.—**Ralph Hubbart** has been advanced to chairman of the board, while **Frank H. Bishop** succeeds him as president.

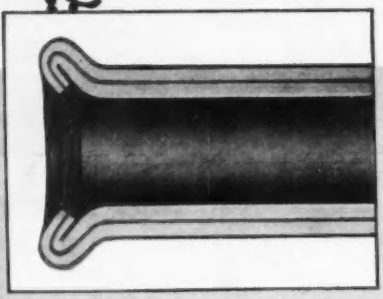
R. M. Hollingshead Corp.—**Donald O. Severson** has been made vice president in charge of sales and merchandising.

Westinghouse Electric Corp.—**Edward O. Boshell** was recently elected a director.

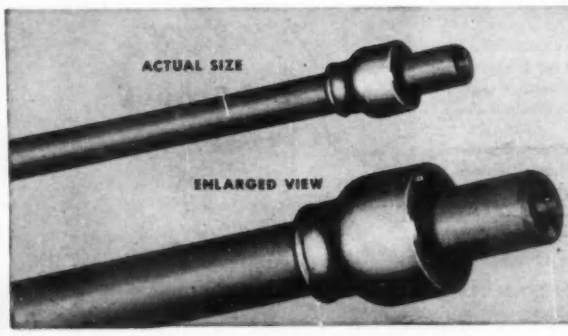
Willys-Overland Motors, Inc.—**George Martin** has been promoted to general parts and service manager.

(*Turn to page* 164, *please*)

Bundyweld gives you



DESIGN SAVINGS—Although meeting customer specifications is the primary concern at Bundy, cost-saving design improvements can often be pointed out. An example: the brake-line part shown above, where original specifications called for armored ¼-.028″ tubing. By devising a method to flare ⅜-.060″ tubing, Bundy engineers eliminated armoring and soldering operations. The result: over-all savings to the customer from reduced number of parts and operations, yet no compromise in tubing function.



PRODUCTION SAVINGS—You get full benefit of Bundy's never ending search for new ways to produce tubing parts better and faster at lower cost. The manifold tubing part at left is an example. Despite the fact that the sleeve must not only be formed but crimped to the tube, Bundy engineers created a method to produce the part complete in a single operation. Production savings in cases like this are passed on to you as a Bundy customer.

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

more for your automotive tubing dollar

When you specify Bundyweld, you get matchless tubing features, time-proved safety, plus full benefit of priceless engineering skills.

You get more for your tubing dollar when you choose Bundyweld for brake lines, oil lines and other automotive tubing parts. Look at all you buy:

1. **Unequalled features.** Bundyweld is the only tubing double-walled from a single strip, copper-brazed through 360° of wall contact. It's leakproof. It's lighter, yet stronger—withstands severe shocks and has high fatigue limit.

2. **Safe performance.** The trouble-free performance of over 360,000 miles of Bundyweld used in automotive tubing parts in the last twenty years is testimony to its safety.

3. **Priceless engineering skills.** Bundy engineers are right on hand to help you get simpler, cost-saving part designs and easier fabrication procedures. If you wish, Bundy will fabricate tubing parts for you, deliver them as you want them, when you want them.

Be *sure* you get the most from your tubing dollar. Specify Bundyweld, your greatest automotive tubing buy on every count.

Contact a Bundyweld Distributor (listed below), or write *Bundy Tubing Company, Detroit 14, Michigan*

FABRICATION SAVINGS—Originally, this gas-tank riser tube of ⅝" tinned Bundyweld was fabricated in two operations: shearing and flattening. Bundy engineers went to work, found a way to produce the part complete in a single operation combining piercing and flattening. The result: lower cost per piece because of reduced number of operations. More, the new method gives a part with greater strength, smoother edges. Specify Bundyweld, and you tap engineering skills that help you bring fabrication costs down to rock bottom.

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . . continuously rolled twice around laterally into a tube of uniform thickness, and passed through a furnace. Copper coating fuses with steel. Presto . . . Bundyweld, double-walled and brazed through 360° of wall contact.

← **NOTE** the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • **Chattanooga 2, Tenn.:** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • **Chicago 32, Ill.:** Lapham-Hickey Co., 3333 W. 47th Place • **Elizabeth, New Jersey:** A. B. Murray Co., Inc., Post Office Box 476 • **Philadelphia 3, Penn.:** Rutan & Co., 1717 Sansom St. • **San Francisco 10, Calif.:** Pacific Metals Co., Ltd., 3100 19th St. • **Seattle 4, Wash.:** Eagle Metals Co., 4755 First Ave. South **Toronto, Ontario, Canada:** Alloy Metal Sales, Ltd., 181 Fleet St., East • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**

Helicopter Powerplant Analysis

(Continued from page 37)

their installation out of the fuselage proper, leaving the desirable area directly under the rotor free for the variable cargo and fuel loads:

3. The safety and economy of fuels cheaper and less volatile than gasoline.

4. Future improvements in gas turbine efficiencies.

5. Simplest possible accommodation of multi-engine arrangements. (Each engine's free-wheeling clutch automatically disengages it in event of failure.)

Geared gas turbines appear to constitute the best rotor propulsion method for medium size, general application, heliocopters.

These advantages have been borne out by this manufacturer's design studies of turbine powered aircraft.

Fig. 2 shows a small four-place helicopter powered by a mechanical drive gas turbine. It is accessibly and conveniently located on the cabin roof. The variable passenger and cargo loads fall on the aircraft center of gravity as does the below-floors fuel tank.

Analysis:

Reciprocating Engine Drive

Hovering Power

Distribution	Per Cent
Tail rotor	7
Cooling Fan	4
Gearing	2
Main rotor	87
Total	100

With 200 take-off bhp from the engine, adequate sea level hovering performance at 2200 lb gross weight is provided. This infers 174 bhp to the rotor at take-off power.

Cruising is considered to take place with a reciprocating engine at 75 per cent of take-off bhp, or in this case at 150 bhp. Power to the rotor therefore would be 87 per cent of 150 bhp which is 131 bhp.

Weights	
Performance gross, lb	2200
Empty, lb	1507
Useful load, lb	693

or 46 per cent of empty weight

Reciprocating engines, in full rpm helicopter service have a cruise fuel rate of 0.60 lb/bhp hr. Thus, the cruise fuel rate for this engine is equal to the cruising bhp (150) multiplied by the fuel rate (0.60). For this example, the cruise rate is 90 lb/bhp hr (15 gph) at 150 bhp.

Therefore, using the useful load of 693 lb and dividing by the fuel rate at cruising speed, 90 lb/bhp hr, the ultimate duration of the helicopter would be 7.7 hr.

Analysis:

Turbine Engine, Mechanical Drive

Proposed small high pressure ratio, six to one, gas turbine engines weigh about 0.6 lb per sea level standard take-off hp. On a 100 F day, though, they can furnish about 86 per cent of their standard power.

The output shaft speed of these engines are roughly twice those of comparable reciprocating engines. This necessitates an additional step of helicopter gearing and an additional one per cent of gearing loss.

(Turn to page 118, please)

Simple
or
complex

Precision in Bronze

FEDERAL Mogul

From print to product . . . in exact detail of alloy and physical dimension . . . plain or complicated . . . in wide variations of size and shape . . . rigid quality control. Complete research and engineering service . . . capacity now available. Your inquiry is invited.

FEDERAL-MOGUL CORPORATION, 11037 SHOEMAKER, DETROIT 13, MICHIGAN

SINCE 1899

Products of our six plants include: Sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bimetallic rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.

FEDERAL-MOGUL

Helicopter Powerplant Analysis

(Continued from page 116)

The reciprocating engine's four per cent cooling fan power requirement is, however, avoided.

Hovering Power Distribution	Per Cent
Tail rotor	7
Gearing	3
Main rotor	90

To obtain the same main rotor bhp as the reciprocating engine under the circumstances described, the turbine engine would have to have a take-off rating of 225 bhp. Cruise bhp would be 146 or 65 per cent of take-off power.

At this fraction of take-off horsepower, the cruise fuel rate is shown by the data in the accompanying table to be:

$=1.075 \times 0.767 \quad =0.825$ lb/bhp hr

$0.825 \times 146 = 120$ lb/hr or 20 gph

Bell Model 47 weights to be replaced by a gas turbine engine are as follows:

Engine as installed, lb	306.5
Engine accessories, intake and exhaust system, lb	16.0
Power plant controls, lb	5.5
Starting system, lb	19.0
Cooling, including fan and drive housing, lb	13.8
Lubricating system, lb	23.1
Fuel system, lb	28.0
Starting battery and container, lb	40.8
Total, lb	452.7

The following turbine engine weights are based upon a 500 bhp engine and are thus optimistic for the actual 225 bhp considered; but are adequately accurate for average size helicopters:

Engine, lb	135.0
Power plant controls, lb	5.5
Starting system, lb	17.0
Lubricating system, lb	10.0
Fuel system, lb	37.3
Starting battery and container, lb	60.0
Added transmission and clutch cooling, lb	21.5
Jet deflector tail pipe and shield, lb	10.0
Total, lb	296.3

Therefore, the turbine engine installation weighs 156.4 lb less than the reciprocating engine. Thus the turbine powered helicopter will be able to haul a useful load of 849.4 lb

(Turn to page 122, please)

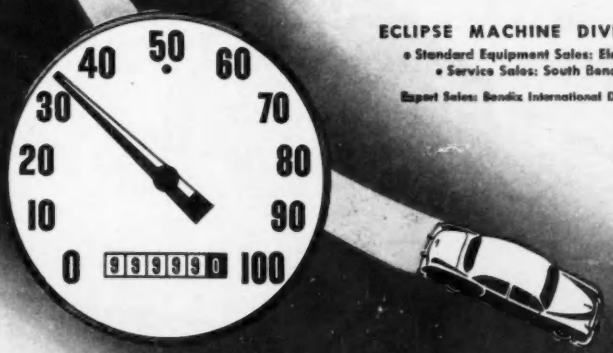
STROMBERG

CARBURETORS

Judge Value As Your Customers Will — on *Lasting Performance!*

The performance of the car you build and sell *today* may very well be the deciding factor in some *future* automobile sale. It is just good business, therefore, to choose your engine components on the basis of *long-range economy*. In carburetors, the name Stromberg is famous for better performance —it is also a fact that Stromberg Carburetors *last longer*. Judge value as your customers will and you will agree— Stromberg* Carburetors are the logical choice.

*REG. U. S. PAT. OFF.



ECLIPSE MACHINE DIVISION OF
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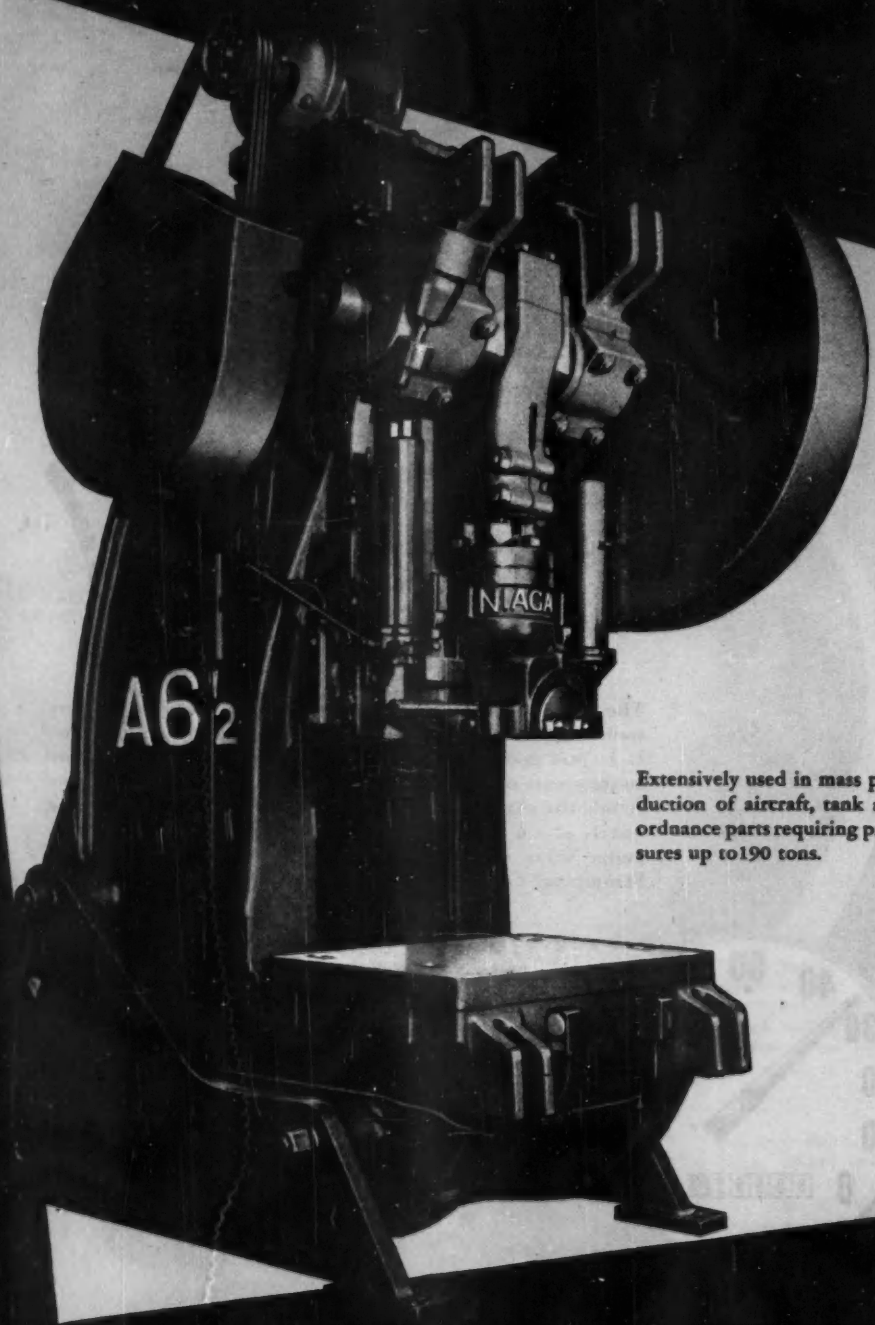
NIAGARA



Extensively used in mass production of aircraft, tank and ordnance parts requiring pressures up to190 tons.

NIAGARA MACHINE & TOOL WORKS · BUFFALO 11, N. Y.

A COMPLETE LINE of INCLINABLE PRESSES

13 SIZES...

6½" to 1¼" Diameter Shafts

For your defense contract work, get Niagara presses to insure maximum output, long die life and uninterrupted production.

Widely employed in quantity production of small components for the aviation, ordnance and electronics industries.

Manufacturers of a complete line of sheet metal working equipment ranging from small hand tools up to large power operated machinery.

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or 63 per cent of its empty weight. The ultimate duration, however, will be somewhat shorter than the conventional craft—7.07 to 7.70 hr.

Special Air Force Helicopter Projects

By Captain Wayne W. Eggert,
Experimental Flight Test Officer,
Flight Test Div.,
Wright Air Development Command
Wright-Patterson AFB

Automatic Pilot

The Air Force conducted a study from 1947 to 1949 looking for some means to get stabilized flight in a helicopter through gyroscopic devices. In November, 1950, a modified E-6 automatic pilot was selected to be installed in a single rotor helicopter. First, a rate signal had to be included in both the pitch and roll and initial settings predicted. Flight tests were flown with a combination of many settings. However, the actual settings were very close to the predicted. Rudder was connected to the automatic pilot the latter part of the flight program.

Another project is in progress using a modified E-6 automatic pilot on an Air Force production helicopter. The big difference from the first installation is differential input method of control which eliminates controls other than normal flight controls. Size and weight of some component parts has been reduced so that the total weight of the installation is about 55 lb.

Performance Testing Methods for Helicopters

Performance testing techniques formerly used by the Flight Test Division in evaluatng helicopters were essentially the same as those used in testing all types of conventional airplanes from jet propeller fighters to very heavy bombers and cargo airplanes. Since the helicopter is considerably different from conventional aircraft in many ways, a more specialized approach to flight testing was developed to lead to more accurate, consistent results. Present deficiencies and needs, recognized by all concerned, caused this project to be initiated. The first step taken was to review the various performance flight test and data reduction methods in use throughout industry and Government agencies. In particular, methods of correcting data for the difference between test weight and standard weight were investigated. Flight tests were conducted wherever the technique was new to the Flight Test Division.

The conclusions from actual flight evaluation of the techniques decided upon indicated that the required flying time and engineering time was the same as present conventional methods. The form of presentation affords considerably greater flexibility and usefulness of flight data than has been available in the past.

Range Extension

The first part of the program was to determine the possibility of towing a helicopter behind another aircraft and to establish the procedures for the pilots. The purpose was to increase the present range to increase utilization of the helicopter. The Air Force is presently considering the air hook-on with the ultimate goal of pulling the helicopter in and carrying it piggy back on another aircraft.

(Turn to page 125, please)


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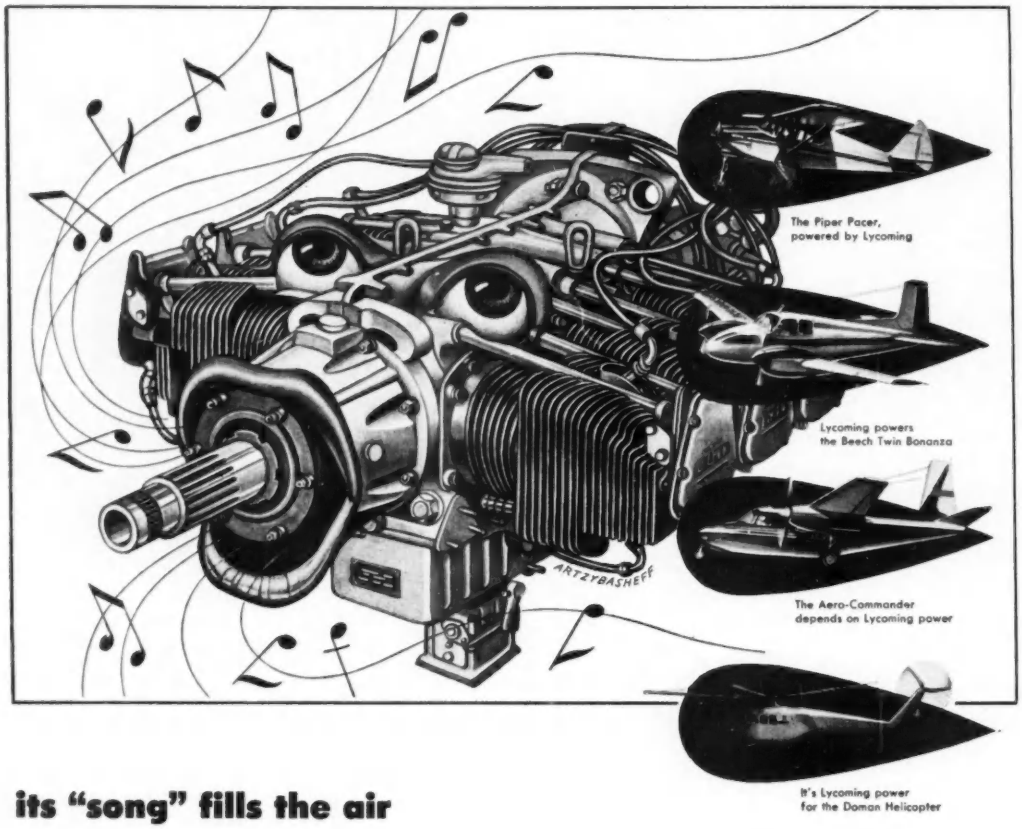

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LYCOMING-SPENCER DIVISION, WILLIAMSPORT, PA.
BRIDGEPORT-LYCOMING DIVISION, STRATFORD, CONN.
AVCO MANUFACTURING CORPORATION

Helicopter Powerplant Analysis

(Continued from page 122)

Load Factor Tests

It was thought the present load limit for the helicopter is too high so a test was conducted to determine the highest accelleration encountered in flight. By reducing the load limit factor, it in turn would reduce the weight of the helicopter.

Stabilizer

The Air Force has developed three stabilizing devices and flown two of them. The basic concept of two of the stabilizers centered in allowing the rotor to act as a free body. One of these was not flown. The conclusion drawn from flight test data of the other stabilizer was that any improvement in the stability of the helicopter was obtained at a sacrifice of controllability. The third stabilizer has a different theoretical approach. This method consists of coupling the collective blade pitch angle with the collective blade flapping or coning angle while no coupling is provided between cyclic pitch and cyclic flapping angles. Theoretical analysis shows this type of linkage will provide rotor blade angle of attack stability in forward flight.

Helicopters for the Short Haul

By J. E. Rothman,
Chief Engineer,
New York Airways, Inc.

Highly significant among the benefits to commerce that helicopter service can produce is the impetus that it can give to the pressing need for industrial decentralization, so greatly demanded by the metropolitan area. Penalties in the delay of the mails, even undue penalties in the transport by air of passengers, no longer need seriously hinder the movement away from the heart of a great metropolis to its less congested environs.

Metropolitan areas with their important suburban communities develop a substantial amount of short-haul transportation both with regard to air mail and the transportation of passengers. Air transportation of the short haul type in the interest of commerce must be developed, but it cannot be developed without some solution of the acute airport-to-city travel problem. The only hope of some solu-

(Turn to page 126, please)

Helicopter Powerplant Analysis

(Continued from page 125)

tion for that problem lies with the helicopter.

The future pattern of air transportation in this country is likely to make obsolete the reciprocating engine fixed-wing airplane and divide travel between the long-haul jet plane operating out of an airport away from congested metropolitan areas with cruising speed between 400-600 mph and the short-haul helicopter whose cruising speed is certain to be increased to 150-200 mph but still land and take off safely in the heart of a city.

Advancement of aviation by giving it the opportunity mail-wise and passenger-wise to penetrate significantly the field of short-haul transportation, where hitherto aviation has been singularly ineffective, provides a second gain. A third gain is the advancement of high-speed and long-distance air transport aircraft which demand longer runways and better approaches. Many navigational and operational problems have arisen out of the development of faster means of long-haul transportation requiring larger airports continually more remote from metropolitan areas. Only the helicopter can bring them back within the convenient and economic radii of metropolitan air transport. Intra-city-area transport will provide a true feeder service to our air transport system.

Mexican Rubber Output Seen on Sharp Upswing

According to recent calculations made by Mexican tire producers, Mexican rubber production may slowly rise to 15,000 tons annually, a figure which is estimated as sufficient for the necessities of the national tire industry. It is reported that additional rubber production could be earmarked for export.

These calculations are based on the fact that important rubber plantations have come into being in the States of Veracruz, Tabasco, Chiapas, and Oaxaca. It is estimated that in the next few years Mexico will have a production sufficient to free it from the necessity of importing rubber.

During 1951 the national rubber industry produced 690,691 tires for automobiles and trucks and 37,814 bicycle tires. Inner tubes for cars and trucks amounted to 457,089, while bicycle inner tube production totaled 20,673.

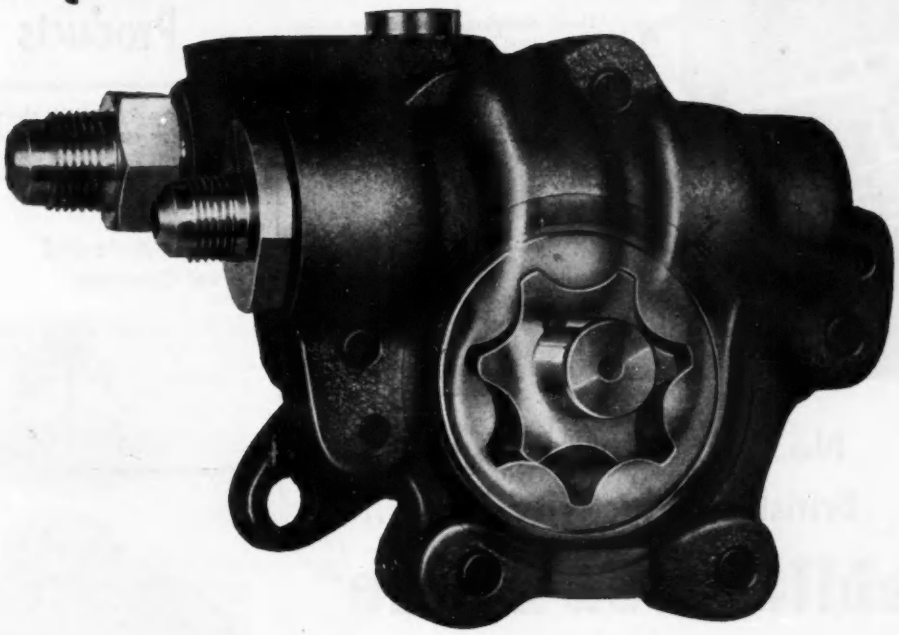
Italian Firm to Make Parts for Thunderjet

Republic Aviation Corp. recently signed a contract with Finmeccanica of Italy for the manufacture of components and parts for F-84 Thunderjets being supplied to European nations under the Mutual Defense Assistance Pact. The Italian corporation will manufacture some 1600 components made up of approximately 8000 parts for Thunderjets at factories in Naples and southern Italy.

K-F Stockholders Seek RFC Data

The Kaiser-Frazer Corp. Stockholders Protective Committee is becoming more militant in its demands for financial information about the company. It has demanded that the Reconstruction Finance Corp. make public first-quarter sales and earnings figures as submitted by K-F under its loan agreements with the agency.

Compact Power for Power Steering



Eaton Rotor Pumps with Flow-Control

Where space is at a premium, the Eaton high-speed power unit provides the advantage of small, compact design. As a pioneer in the development of pumps with flow control for hydraulic power steering, the Eaton Pump Division offers unequalled facilities in both design and production. If you are considering power steering, there are distinct benefits in permitting our engineers to work with yours in the early design stages.

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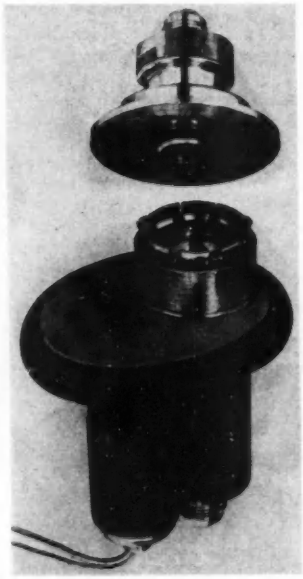
New Aircraft Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 68)

Solenoid Actuated Fuel Coupling



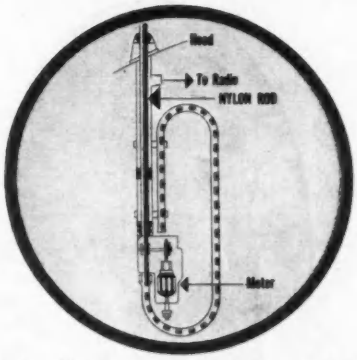
Wiggins solenoid actuated fuel coupling.

A solenoid actuated fuel coupling for missiles has been recently placed on the market. The coupling may be disconnected by a 24 v line, remotely controlled; or by a manually operated trigger. When fueling is completed, this leakproof coupling disconnects. The socket half stays on the ground, while the nipple half is ejected with the missile. Purpose of the bumper ring, surrounding the outside of the coupling is to prevent injury to socket half of coupling when it hits the ground, after launching.

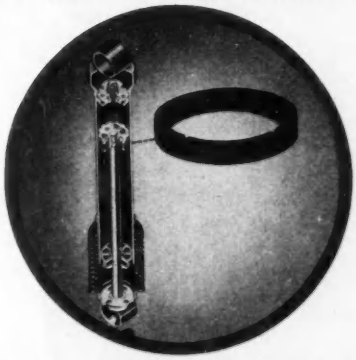
The product is made of aluminum alloy, and is currently in production in ½ in. and ¾ in. tube sizes. *E. B. Wiggins Oil Tool Co.*

Circle P-5 on page 65 for more data

Du Pont NYLON plastic gets the tough automotive jobs



The automatic antenna in the Packard automobile has a 4½' flexible nylon rod that raises and lowers the "live" members. Nylon was the only material flexible enough to fold into a trombone-like position when the antenna was down, yet rigid enough to force the antenna up and down. Designed by Casco Products Corp., Bridgeport, Conn.



A piston ring molded of Du Pont nylon functions as a thermostat that automatically regulates the flow of hydraulic fluid in this shock absorber at any temperature. Nylon withstands the 205°F. maximum operating temperatures . . . the 200 lbs. pressure build-up of shock. Molded by Formold Plastics, Inc., Chicago, for Heckethorn Manufacturing and Supply Co., Littleton, Colo.

Hudson engineers cut in half the space required for floorboard clutch and brake assemblies by installing pedal-toeplate bumper seals containing washers of Du Pont nylon. Nylon withstands the abrasion...seals against engine noise, fumes and dirt. Molded by Sinko Manufacturing & Tool Co., Chicago.

...meets mechanical requirements
...gives outstanding performance
...cuts production costs

For efficiency, economy and durability in automobile parts where the going is tough, you can't beat Du Pont nylon plastic. Nylon is non-conductive . . . unaffected by gasoline or oil...absorbs shock without chipping or denting ...resists heat up to 250°F. It can be injection-molded into thin and intricate sections of exceptional strength. This makes possible mass production of complex parts at low cost per unit.

The examples on this page are just three of the many tough jobs Du Pont nylon is doing in the automobile industry today.

Perhaps nylon's strength, resiliency and other valuable properties can help improve or develop a product for you. Nylon is available. For further information on nylon and other Du Pont plastics, write:

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WHAT *Life-Lines* REALLY DELIVER IS MORE SERVICE...LESS SERVICING

The way to grease modern motors is DON'T!

The modern, *pre-lubricated* Life-Line consigned greased fittings to the motor museum almost ten years ago—and did away with faulty lubrication.

Think what it means. No more incorrectly greased motors. No failures from overlubrication, from under lubrication . . . from use of incorrect or dirty grease. Correct lubrication is sealed in . . . in advance.

Result? Longer motor life. Over a half million *pre-lubricated* Life-Line motors operating in every conceivable type of application have proved that outages from incorrect lubrication have been eliminated completely.

Take the case of an eastern manufacturer, for example. Motors were installed high on a press—out of reach of a maintenance man. Consequently, motor lubrication was forgotten. Bearings failed—windings burned. Then *pre-lubricated* Life-Lines were installed. Failures disappeared. Today, motors are still forgotten—but safely.

Remember, the way to lubricate a modern motor is don't. And, to spot a *truly* pre-lubricated motor, look for a motor that has *no* grease fittings. You'll *know* then it needs no greasing attention. You'll find your answer in Life-Lines.

Ask your nearby Westinghouse representative for a copy of "Facts on Pre-lubricated Bearings, B-4378", and for all the reasons why Life-Lines offer you more service on the job . . . less servicing. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21682

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Life-Line
MOTORS and CONTROLS

Defense Contract Awards

This latest list of defense prime contracts that have been awarded covers the period from Apr. 26 to May 16. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

Unit quantities and dollar amounts are given for contracts from $25,000 to $250,000. Contracts above $250,000 are indicated by "over $250,000," but their actual dollar amounts and unit quantities are not available.

—A—

AC Spark Plug Div., GMC., Flint, Mich.
Vehicle parts—4752—$162,328

Active Gear Co., Inc., Chicago, Ill.
Vehicle parts—1080 ea—$198,720
Vehicle parts—1410 ea—$90,860
Vehicle parts—11,000 ea—$119,020

Ainsworth Mfg. Corp., Detroit, Mich.
Vehicle parts—4000 ea—$52,000

Airesearch Mfg. Co., Los Angeles, Calif.
Actuator—$43,453

Allis-Chalmers Mfg. Co., Milwaukee, Wisc.
Tractor—6 ea—$83,744

Allison Div., GMC., Indianapolis, Ind.
Vehicle parts—200 ea—$25,000

American Cable Div., Wilkes-Barre, Pa.
Hardware—177,000 ea—$41,062

Aro Equipment Corp., Bryan, Ohio
Spare parts—$1,415,905

Austin Metal Products, Detroit, Mich.
Windshield asm.—21,700 ea—$718,921

Autocar Company, Ardmore, Penna.
Truck body parts—various—$80,876

Auto Specialties Mfg. Co., St. Joseph, Mich.
Mine, antipersonnel—360,000—$714,691

—B—

Barr Rubber Products Co., Sandusky, Ohio
Vehicle parts—3200 ea—$101,056

Bearings Co. of America, Lancaster, Pa.
Hardware—29,700 ea—$107,973

Beech Aircraft Corp., Wichita, Kansas
Supplies—$1,723,192

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
Wheel & brake asm.—$423,156
Vehicle parts—3900 ea—$45,942

Bendix Radio Div., Bendix Aviation Corp., Baltimore, Md.
Components—6000 ea—$1,628,753

Blackston Mfg. Co., Chicago, Ill.
Indicators—8435 ea—$1,056,030

Bostrom Mfg. Co., Milwaukee, Wisc.
Vehicle parts—42,000 ea—$145,720

Briggs & Stratton Corp., Milwaukee, Wisc.
Engines, gasoline—950 ea—$107,008

Brockway Motor Co., Cortland, N. Y.
Motor vehicle parts—1290 ea—$31,245
Transfer—200—$88,110

Buda Co., Harvey, Ill.
Spare parts—various—$42,904
Spare parts—various—$55,600

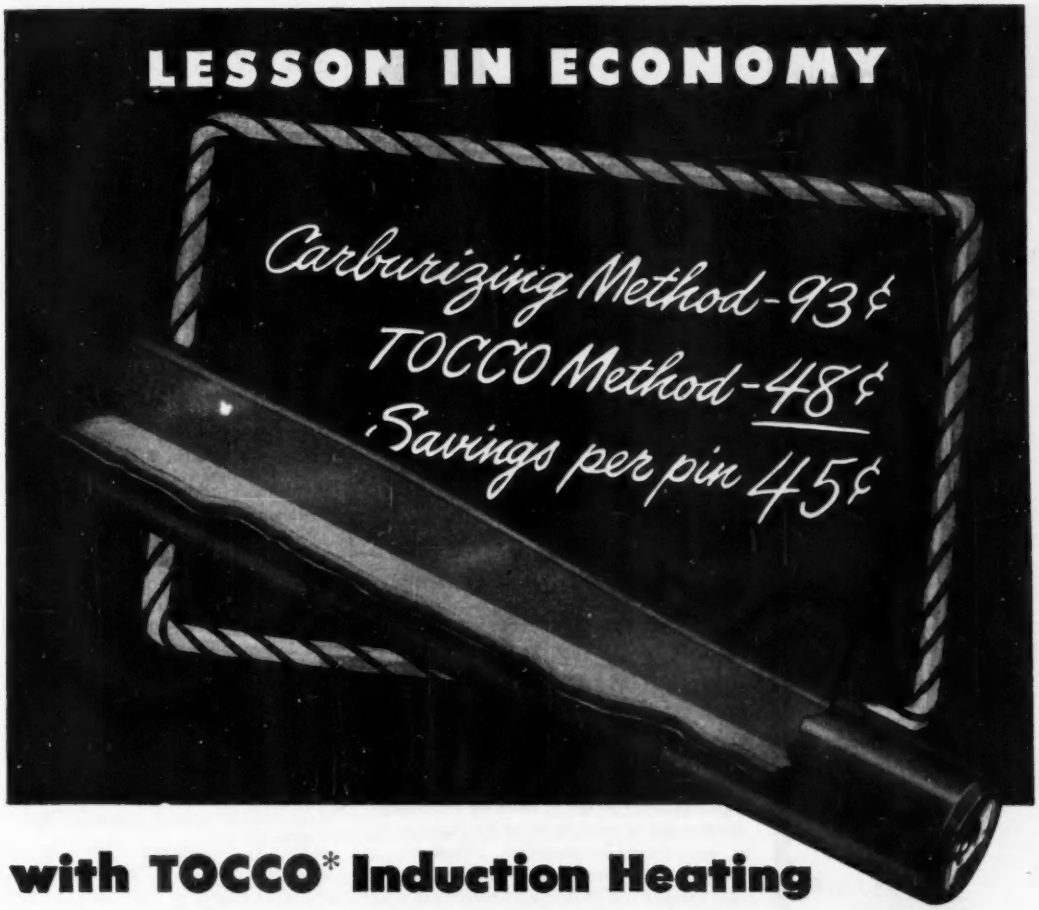
—C—

Carlisle Tire & Rubber Co., Carlisle, Pa.
Tires & tubes—4200 ea—$75,028

Carter Carburetor Corp., St. Louis 7, Mo.
Vehicle parts—85,000 ea—$153,649

Caterpillar Tractor Co., Peoria 8, Ill.
Spare parts—various—$53,494
Spare parts—various—$159,399
Spare parts—various—$67,000

(*Turn to page 134, please*)



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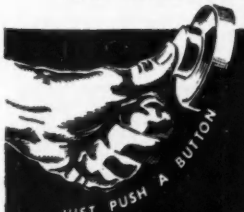

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Tractor—10 ea—$360,924
Spare parts—various—$1,230,333
Spare parts—various—$167,748
Spare parts—various—$324,376
Spare parts—various—$208,480
Spare parts—various—$61,058
Spare parts—various—$133,336
Spare parts—various—$109,022

Chandee - Evans Div., Niles - Bement-Pond Co., West Hartford, Conn.
Valve asm.—1080 ea—$97,824

Chevrolet Motor Div., GMC., Detroit, Mich.
Truck—171 ea—$366,796

Chrysler Corp., Detroit, Mich.
Vehicle parts—42,708 ea—$26,727
Vehicle parts—4800 ea—$49,091
Vehicle parts—16,300 ea—$35,498
Final insp. gages to tank—1 set—$1,333,798
Services for insp. gages—$647,689

Cleveland Graphite Bronze Co., Cleveland, Ohio
Motor vehicle parts—4600 ea—$115,460

Continental Aviation & Eng. Corp., Detroit 14, Mich.
Maintenance parts—76 ea—$47,728

Continental Motors Corp., Detroit 8, Mich.
Vehicle parts—7750 ea—$101,296

Continental Motors Corp., Muskegon, Mich.
Spare parts—various—$26,054

Cooper Tire & Rubber Co., Findlay, Ohio
Tires & tubes—6800 ea—$99,465
Tires & tubes—4100 ea—$48,298

S. J. Corbett Co., Detroit, Mich.
Vehicle parts—20,000 ea—$115,000
Motor vehicle parts—10,000 ea—$45,400

Cummins Engine Co., Columbus, Ind.
Generator set—33—$370,255
Spare parts—job—$63,065

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J.
Propeller asm.—$468,007

—D—

Dana Corp., Toledo, Ohio
Vehicle parts—10,000 ea—$88,992
Vehicle parts—5575 ea—$83,805
Vehicle parts—2960 ea—$163,630

Denman Rubber Mfg. Co., Warren, Ohio
Tires & tubes—1100 ea—$26,319
Tires & tubes—1,307 ea—$81,660

Detroit Diesel Engine Div., GMC, Detroit 28, Mich.
Generator set—10—$59,170

Detroit Diesel Engine Div., GMC, Wayne, Mich.
Vehicle parts—12,580 ea—$71,713

Detroit Gasket & Mfg. Co., Detroit, Mich.
Vehicle parts—67,600 ea—$55,758

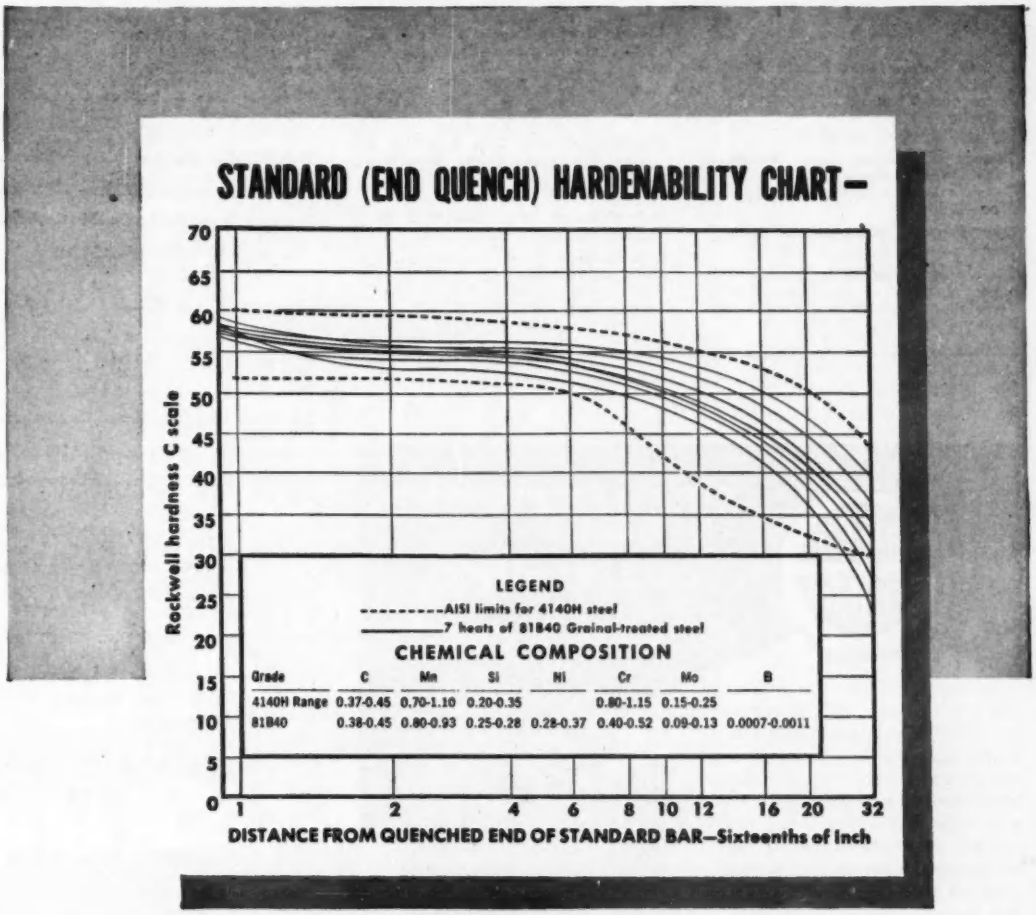
Diamond T Motor Car Co., Chicago, Ill.
Automotive parts—$53,400
Vehicle parts—2200 ea—$280,522

Diesel Motors Co., Port Washington, N. Y.
Spare parts—$63,563

Dismuke Tire & Rubber Co., Inc., Clarksdale, Miss.
Tires & tubes—12,000 ea—$176,579

Durham Aircraft Service, Inc., Woodside, N. Y.
Maintenance parts—39,723—$39,723

(*Turn to page* 136, *please*)



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The curves above show the relationship between the hardenability of a series of seven heats of 81B40 steel and the hardenability band for 4140H steel, which it often replaces. The 81B40 heats were made in one electric furnace shop, and the remarkably consistent hardenability shown by the curves was obtained by the use of Grainal alloy as the means of adding the boron.

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— E —

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Spare parts—$636,663
Indicators—142,266
Transmitter—3095 ea—$604,553

Thomas A. Edison, Inc., Instrument Div., West Orange, N. J.
Cylinder head temperature bulb—8520 ea—$70,119

Eidal Mfg. Co., Albuquerque, N. M.
Spare parts—various—$75,284

The Electric Auto-Lite Co., Toledo, Ohio
Motor vehicle parts—27,075 ea—$124,325
Vehicle parts—39,988 ea—$81,743
Battery—19,800 ea—$352,638

Electric Service Engr. Co., Joliet, Ill.
Motor generator sets—$1,247,122

— F —

Fairchild Aircraft Div., Fairchild Engine & Airplane Corp., Hagerstown, Md.
Spare parts—$120,000

Federal-Mogul Corp., Detroit 13, Mich.
Vehicle parts—800 ea—$77,504

Federal Motor Truck Co., Detroit, Mich.
Motor vehicles—850 ea—$108,375
Vehicle parts—1000 ea—$48,537
Vehicle parts—3937 ea—$42,193
Vehicle parts—160 ea—$69,592
Truck—30 ea—$197,121
Vehicle parts—6000 ea—$116,280
Spare parts—$31,246

Firestone Tire & Rubber Co., Akron, Ohio
Tires—1385 ea—$34,186

Flex-O-Tube Meriden Corp., Detroit, Mich.
Hose fitting asm.—190,000 ea—$30,590

Fontaine Truck Equip. Co., Birmingham, Ala.
Vehicle parts—1760 ea—$255,200

— G —

Gar Wood Industries, Wayne, Mich.
Vehicle parts—5550 ea—$26,131
Vehicle parts—2249 ea—$84,336
Vehicle parts—778 ea—$76,767

The Gear Grinding Mach. Co., Detroit 11, Mich.
Vehicle parts—16,000 ea—$239,040

General Electric Co., Schenectady, N. Y.
Spare parts—$1,647,679
Training command equipment—$500,000
Indicator, electric—$408,785
Indicators & transmitters—$73,289

General Electric Co., Syracuse, N. Y.
Mod kits—$96,278

General Motors Serv. Div., GMC, Detroit, Mich.
Vehicle parts—5185 ea—$29,448

General Motors Corp., Ternstedt Div., Detroit, Mich.
Range finder—2 sets—$110,279

GMC Truck & Coach Div., GMC, Pontiac, Mich.
Vehicle parts—5800 ea—$36,018
Tank-automotive parts — 99,455 — $139,-301

The B. F. Goodrich Co., Akron 18, Ohio
Asm. parts—3980 ea—$58,051
Maintenance parts—34 ea—$46,071
Brake asm.—307 ea—$58,914

Goodyear Tire & Rubber Co., Akron, Ohio
Track—27,500—$5,725,500
Vehicle parts—70,000 ea—$1,530,200
Maintenance parts—4480 ea—$38,231
Wheel assembly—$149,380
Ring, plug, bushing etc.—$534,051

Grumman Aircraft Eng. Corp., Bethpage, L. I., N. Y.
Maintenance parts—1684 ea—$83,083

— H —

Harding Devices Co., Dallas, Texas
Piston & ring asm.—$25,096

Hartzell Propeller Co. Div., Hartzell Industries Inc., Piqua, Ohio
Propeller asm.—$46,121

Hygrade Prod. Div., Standard Motor Prod., Inc., Long Island City, N. Y.
Vehicle parts—72,000 ea—$64,800

— I —

Inland Mfg. Div., GMC, Dayton, Ohio
Tank track—12,500—$2,379,000
Tank track—31,250—$3,737,500

(*Turn to page* 138, *please*)

faster assembly!
better locking!

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fastener unit!

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International Harvester Co., Melrose Park, Ill.
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Tractor—20 ea—$1,563,678
Tractor—25 ea
Tractor—28 ea
Tractor—30 ea
Tractor—50 ea—$956,299

International Harvester Co., Washington 5, D. C.
Panel truck—32 ea—$73,962

International Spare Parts Div., Queensboro Pkg. Corp., Long Island City, N. Y.
Vehicle parts—2313 ea—$24,534

—J—

Jacobs Aircraft Engine Co., Pottstown, Pa.
Spare parts—$1,095,581

—K—

Kenworth Motor Truck Corp., Seattle, Wash.
Vehicle parts—300 ea—$29,043

—L—

Lamson & Sessions Co., Cleveland, Ohio
Hardware—410,000 ea—$25,853

Lear, Incorporated, Elyria, Ohio
Pumps—$254,193

Lear, Incorporated, Grand Rapids, Mich.
Actuators—128 ea—$38,266

The Lewis Eng. Co., Naugatuck, Conn.
Temperature indicator—1049 ea—$41,487

Link Aviation, Inc., Binghamton, N. Y.
Trainer—29 ea—$500,000

Lipe Rollway Corp., Syracuse 1, N. Y.
Vehicle parts—9530 ea—$61,070

Lord Mfg. Co., Erie, Pa.
Engine mounts—$122,475

—M—

Machine Tool & Die Co., Detroit, Mich.
Motor vehicle parts—8000 ea—$49,600
Vehicle parts—4410 ea—$72,102

Mack Mfg. Corp., Plainfield, N. J.
Vehicle parts—600 ea—38,934
Vehicle parts—11,900 ea—$42,143

The Magnavox Co., Fort Wayne, Ind.
Control assembly—50,000 ea—$139,750

Mansfield Tire & Rubber Co., Mansfield, Ohio
Tire & tubes—3140 ea—$148,979
Tire & tubes—440 ea—$39,014

McCabe-Powers Auto Body Co., St. Louis 15, Mo.
Vehicle parts—85 ea—$26,851

Michiana Products, Corp., Michigan City, Ind.
Vehicle parts—7350 ea—$120,708

(*Turn to page* **140**, *please*)

5 TONS

at your fingertips

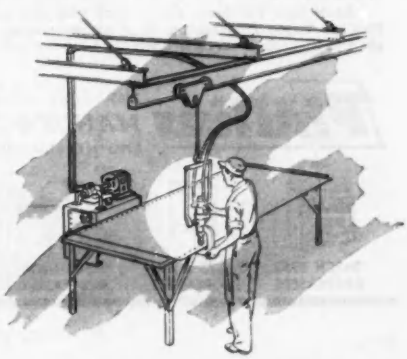
REDUCE HEAVY PLATE HANDLING REQUIRED FOR PUNCHING OPERATIONS!

With the new Danly Portable Hydraulic Piercing Unit, awkward and costly shifting and positioning of heavy plates in fixed equipment is eliminated. This small compact unit can be installed anywhere in the shop . . . the power cylinder itself will deliver up to 12½ tons of piercing pressure at 5000 psi.

And you save with light plate or sheet too because the new Danly Portable Piercing Unit features built-in hydraulic stripping action. The work is held firmly as the punch is withdrawn . . . and there are no springs or rubber cushions to wear out. Write today for complete information.

DANLY MACHINE SPECIALTIES, INC.
2100 S. Laramie Avenue, Chicago 50, Illinois

Weight only 45 pounds . . . designed for application in metalworking shops of all kinds for general duty piercing with a minimum of work handling!



Typical installation of Danly Portable Hydraulic Piercing Equipment

DANLY®

Hydraulic Metalworking Equipment
Standard or Special

Mechanical Presses . . . 50 to 3000 Tons

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Indicators—$35,000

The Mohawk Rubber Co., Akron, Ohio
Tires & tubes—5335 ea—$100,792
Tires—21,140 ea—$1,642,838

Monroe Auto Equip. Co., Monroe, Mich.
Vehicle parts—75,000 ea—$117,375

Mott Haven Truck Parts, Inc., Bronx 55, N. Y.
Vehicle parts—5950 ea—$26,538

—N—

National Mach. Prod. Co., Utica, Mich.
Hardware—3,645,000 ea—$34,469

New Departure Div., GMC, Bristol, Conn.
Hardware—5600 ea—$54,791

New Process Gear Corp., Syracuse, N. Y.
Vehicle parts—20,600 ea—$74,160

North American Aviation, Inc., Los Angeles, Calif.
Training program—$208,865

Northfield Stamping, Melvindale, Mich.
Vehicle parts—10,000 ea—$47,100

—P—

Pacific Tire & Rubber Co., Oakland 1, Calif.
Tires & tubes—6355 ea—$117,861

Tires & tubes—1125 ea—$87,603

Penn Brass & Copper Co., Erie, Penna.
Hardware—3,028,530 ft—$221,096

The Polson Rubber Co., Garrettsville, Ohio
Tires & tubes—18,650 ea—$27,883

—R—

Reo Motors, Inc., Lansing, Mich.
Vehicle parts—5700 ea—$114,685
Component parts for rocket—120,484—$1,235,679
Facilities—$241,402

Republic Aviation Corp., Farmingdale, L. I., N. Y.
Spare parts—$7,450,000
Mobile training units—$446,893

Republic Steel Corp., Cleveland, Ohio
Hardware—10,100 shts—$34,924

Revere Corp. of America, Wallingford, Conn.
Fuel flow transmitter—341 ea—$90,678

Rochester Products Div., GMC, Rochester, N. Y.
Tube burster—444,000—$108,513
Tube burster—468,000—$46,332

—S—

Sales Div., Inc., Detroit 2, Mich.
Tires—10,300 ea—$608,498

Scott Aviation Corp., Lancaster, N. Y.
Spare parts—$262,044

Sheffield Corp., Dayton, Ohio
Range finder—$153,250

Skinner Purifiers Div., Bendix Aviation Corp., Detroit, Mich.
Filter kits—$186,383

Standard Steel Works, N. Kansas City, Mo.
Spare parts—63 ea—$386,141

Stewart-Warner Corp., Chicago, Ill.
Vehicle parts—17,090 ea—$39,061
Vehicle parts—2,500 ea—$25,591
Hardware—2,546,900 ea—$29,651

Stewart-Warner Corp., South Wind Div., Indianapolis, Ind.
Winterization kits—4101—$1,047,244
Spare parts—various—$104,717

Stoner Rubber Co., Anaheim, Calif.
Absorber, cowl engine—$41,730

Studebaker Corp., South Bend, Indiana
Tractor—$20,000,000
Trucks—$195,413,198

Sunbeam Corp., Chicago, Ill.
Electric tachometer indicator—432 ea—$44,403
Tachometer—300 ea—$34,386

—T—

Thompson Products, Inc., Cleveland, Ohio
Pump assemblies—$85,275
Pump assemblies—$85,275

Timken Roller Bearing Co., Canton 6, Ohio
Hardware—223,100 ea—$140,106

Truck Seat Inc., Akron 5, Ohio
Vehicle parts—25,200 ea—$61,368

(*Turn to page* 143, *please*)

Spicer

SPECIALISTS IN SERVICE

ARCHIMEDES SAID:

"Give me enough leverage and I will move the world"

Today, the world is moved through the efficiency of Spicer power transmission equipment, performing constructive service in all fields of automobile, truck, bus, tractor and railway car duty.

More Spicer Universal Joints are in use on a greater variety of installations than any make. And Spicer Universal Joints have behind them a longer record of service and experience than any other similar unit. Since 1904, Spicer products have been the Standard of the Industry.

Spicer

SPECIALISTS IN SERVICE

Half-ton or Multi-ton

...every truck service need is met by Spicer Universal Joint Design

Speedy, light-delivery jobs...or dead-weight tonnage involving the world's heaviest loads...every extreme and type of truck service requirement is met by adequate engineering design in Spicer flange- and yoke-type models.

- Sliding splines have ground finish on ALL contact surfaces, extra hardness, and iron manganese phosphate coating.
- True bearing alignment with rigid one-piece yoke design. This *rigidity* is the essence of accuracy.
- Precision bearings with improved surface hardness and finish.
- Dynamically balanced to exacting limits.
- Uniform high quality propeller shaft tubing. *Steel meets our special specifications.*
- Wide selection of flange and yoke types and sizes to suit each individual requirement.

SPICER MANUFACTURING • *Division of Dana Corporation*
TOLEDO 1, OHIO

48 YEARS OF Spicer SERVICE

TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIPE AND AUBURN CLUTCHES • FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIPE" GEAR BOXES • PARISH FRAMES • RAIL CAR DRIVES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAILWAY GENERATOR DRIVES

— U —

United Auto Parts Co., Kansas City, Mo.
Motor vehicle parts—21,841 ea—$138,253
Vehicle parts—400 ea—$35,600

United Motors Service Div., GMC, Detroit 2, Mich.
Vehicle parts—7000 ea—$31,220
Vehicle parts—4800 ea—$194,453

U. S. Gauge, American Machine & Metals, Sellersville, Pa.
Manifold pressure gage—5489 ea—$273,973

United States Motors Corp., Oshkosh, Wisc.
Generator set—69—$236,262

United States Rubber Co., Detroit, Mich.
Tires & tubes—995 ea—$26,165

Universal Products Co., Dearborn, Mich.
Vehicle parts—30,000 ea—$100,500

— W —

Ward LaFrance Truck Corp., Elmira Heights, N. Y.
Vehicle parts—3860 ea—$57,168
Vehicle parts—3725 ea—$41,113

Western Electric Co., New York, N. Y.
Regulators, voltage—$3,057,125

Weston Electrical Inst., Newark, N. J.
Temperature bulb—$33,633

Wheeling Steel Corp., Wheeling, West Va.
Hardware—544,000 lbs—$27,744

The White Motor Co., Cleveland, Ohio
Spare parts—various—$29,353

Wisconsin Motor Corp., Milwaukee, Wisc.
Engine—400—$309,484
Engine—2000—$372,110

Worcester Wire Works Div., National Standard Co., Worcester, Mass.
Hardware—49,600 lbs—$34,771

— Y —

L. A. Young Spring & Wire Corp., Detroit 11, Mich.
Metal parts for shell—300,000—$5,684,400
Facilities—$1,298,703

S.I.A. Celebrates 25th Anniversary

Founded in 1927 by a small group of enthusiasts, the S.I.A. (French Society of Automotive Engineers) celebrated its 25th anniversary recently, in Paris.

President Henri Perrot read a cable of congratulations sent by the American Society of Automotive Engineers and indicated that the 12 original members had grown to more than 3,000, that a branch had been formed at Lyons, and that the S.I.A. had been instrumental in starting similar organizations in Belgium, Spain, and Italy. Every French organization now connected with the industry is said to be represented in the S.I.A.

Latest Methods Featured at Quality Control Convention

LARGE attendance and many interesting technical sessions were features of the Sixth Annual Convention of the American Society for Quality Control which was held at Syracuse, N. Y., May 22, 23, 24. Held simultaneously was an exhibition of quality control equipment at which approximately 38 manufacturers were represented. Attendance at the sessions and exhibits exceeded 2500.

New officers of the Society were installed during the convention. The installation ceremonies were performed by Wade Weaver, Republic Steel Corp., retiring president. He is to be succeeded by Simon Collier, director of quality control, Johns-Manville Corp., New York. For the first time, the Society has elected more than one vice-president. This is permitted by a recent change in the constitution, and has resulted in the election of three men to this office. They are Arthur Bender, Jr., quality engineer, Delco-Remy Division, General Motors Corp., Anderson, Ind.; Raymond S. Saddoris, director of quality, A. O. Smith Corp., Milwaukee, Wisc.; and Dr. Julian H. Toulouse, chief engineer, Quality and Specification Department, Owens-Illinois Glass Co., Toledo, Ohio. Also installed were Edward B. Haden, quality control director, Esterbrook Pen Co., Camden, N. J., as executive secretary, and Paul A. Robert, International Business Machines Corp., Endicott, N. Y., who will serve again as treasurer.

Two awards were made to members of the Society who have made important contributions to its operations. The Society's top award, the Shewhart Medal, was presented to George DeForest Edwards, director of quality assurance, Bell Telephone Laboratories, New York.

Mr. Edwards' acceptance address outlined the fundamental analysis of a process to determine the important characteristics of the product which had an effect on the ultimate quality. He described the series of steps the quality control analyst had to take to determine these characteristics and the best combinations of their values. In order to accomplish this, it has been shown that the combined efforts of all phases of the manufacturing operation must work together as a team.

The second award, the Brumbaugh award of $50, was presented to Dorian Shainin, chief inspector, Hamilton Standard Division of United Aircraft Corp., East Hartford, Conn., for the best article published during the year in the Society's magazine, "Industrial Quality Control."

Several of the 28 technical sessions were devoted to latest developments in quality control in the automotive industries. "Quality control in the production of a complex assembly; an automobile," and "A composite program dealing with methods of controlling small lot precision manufacture and an application of the vendor certification principle" were the

(*Turn to page* 146, *please*)

SUN TEST STANDS FOR USE IN ASSEMBLY BRANCHES OF LARGE CAR MANUFACTURER

car, truck and tractor factories

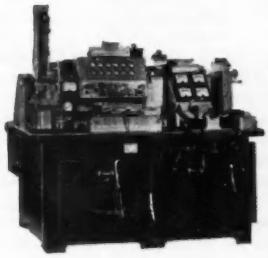
engine builders

component parts manufacturers

eliminate headaches
save thousands of dollars
by
TEST BEFORE DELIVERY

SUN
makes it easier
for you

...with special-order, built-to-specification scientific test equipment



Stations are provided for several men to work simultaneously in testing:

- Generator Regulator
- Ignition Coil
- Fuel Level Indicator
- Oil Pressure Indicator
- Temperature Indicator
- Charge Indicator
- Oil Pressure Sender
- Distributor Tests
- Fuel Gauge Tank Unit
- Generator
- Starting Motor Assembly
- Heat Indicator Bulbs
- Thermostat Temperatures
- Armatures
- Thermostat Leakage

In car, truck and tractor factories and assembly plants; in engine plants and in the factories of component parts manufacturers, SUN Equipment is being used in production testing, spot checking and in Material Return rooms.

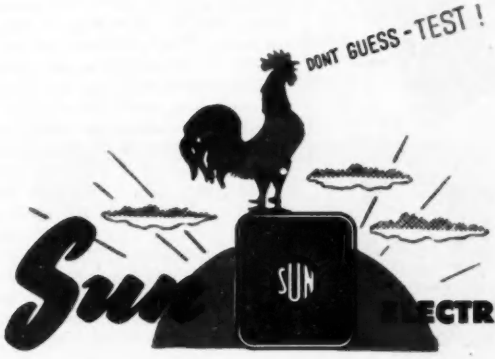
The testing of electrical and other engine accessories, under service conditions, to determine compliance with factory specifications, is a high-speed, simplified operation on SUN Electrical Test Stands. SUN Test Stands are saving innumerable dollars for manufacturers. In many vehicle factories and assembly branches, electrical and other engine parts and systems are being tested on SUN Equipment *before* they are installed on new vehicles.

In Material Return rooms SUN Test Stands are separating the good from the bad.

Among Engine Builders, SUN Test Stands are popular for determining engine performance on equipment identical to that used at the car factory.

Component Parts Manufacturers are finding it advantageous to use the same kind of SUN Equipment the vehicle factory uses.

Tell us your problems and we will be glad to discuss the design of special test equipment for your particular need.



SUN ELECTRIC CORPORATION
6373 AVONDALE AVENUE
CHICAGO 31, ILLINOIS

themes of the sessions dealing with automobiles. Following are extracts from two of the papers presented at the automobile sessions.

Vendor Quality Level Certification

Robert M. Currie,
Ford Motor Co.

The quality of purchased parts has always been a particular source of dissension and dissatisfacton between suppliers and consumers. All of us know that differences are only ironed out when both parties to the difference finally sit down and establish understanding. This means that my point of view must be reconciled on some common basis with your point of view if we are ever to be agreed. Speaking specifically of quality, we cannot fully understand one another as long as we permit the measurement of Quality to be subject, as it all too often is, to the "whims" of our respective inspection organizations.

"Black" to me, as a consumer, must be "black" to you, as a supplier. If you see it "grey" or I later start calling it "white," we are surely and inevitably headed for trouble.

It was for reasons of this kind that Ford became interested in developing Certifications with progressive suppliers. Here, in Certification, is a tool which insures that you and I will be talking in precisely the same terms when we talk about the Quality of the part you supply.

In brief, the Quality Level Certification Agreement is an attachment to the purchase contract. In it the vendor proposes to give simple, continuous, documented assurance that each of his shipments meets a mutually established and reasonable quality level, with respect to certain important characteristics. It differentiates between the important and the unimportant. It brings mutual emphasis to the particular dimensions and other features of a part which most directly bear on the Quality of that part in ultimate use. It sets forth in clear detail what this part must be like, in the main, if we are both to call it acceptable. It establishes the amount of defectiveness which, on the average, we shall both consider passable. It describes a statistically sound sampling system for measuring the conformance of a lot of material to this mutually established acceptable quality level. And finally, by all these means, it welds your quality effort inseparably to mine. Our quality goals as supplier and consumer are identical. Surely it is right that they should be served in a really cooperative way

(*Turn to page* 148, *please*)

The MORAINE -400

Hard to believe a bearing could be so TOUGH!

Tests prove that the new Moraine-400 engine bearings are almost unbelievably tough . . . that they have *six* to *ten* times the life of conventional automotive engine bearings. For example—Moraine-400 bearings were still in good condition after *750* hours of endurance tests—the same tests that cause conventional bearings to fail within *100* hours.

In other tests we reduced the bearing area by one-half, thereby more than doubling the load. Placed in a high-compression automobile engine and run 100 hours at 4300 r.p.m., Moraine-400 bearings were in excellent condition at the end of this tough test.

Overall bearing length ceases to be a limiting factor in automotive engine design when Moraine-400 is used. A shaft of sufficient diameter and rigidity to handle the torque, and journals long enough for good oil-hole design, are all that are required for long bearing life. Moraine-400 operates satisfactorily on both Tocco-hardened and oil-hardened shafts and is outstanding in embedability, conformability and corrosion resistance.

We will soon be in volume production on Moraine-400. They can readily fit into your engine plans for the future.

MORAINE PRODUCTS
DIVISION OF GENERAL MOTORS
DAYTON, OHIO

Moraine-400 is made by the manufacturers of the famous Durex-100 bearings — now used as original equipment on many of the nation's finest cars and trucks.

to the best of our combined abilities!

Certification is positive, and it is sensible, and it is not complicated. I think this requires particular emphasis. We dare not to offer for general use a tool which scares most people off. At this stage in industry's expanding acceptance of scientific methods for quality control, it would be most foolhardy to go very far beyond the technical scope of the majority of those for whom the very idea is developed. These are not laboratory tools that we must deal with. They are shop tools, simple, readily grasped, and generally applicable. If they are otherwise, they must remain statistical curiosities until there is a sufficient broadening of general knowledge in industry to permit full appreciation.

Our approach to Certification has been deliberately tailored with this in mind. The keynote is "understanding," not "statistics." The latter are, of course, introduced as a significant part of the technique, but in the simplest way we could conceive.

In a relatively short space of time Ford has accepted Vendor Quality Certification on more than 170 separate parts. Each has required some initial effort from both the supplier and ourselves. But may I emphasize that it is only the kind of effort that should in any event have been expended if we were ever by this means or by any other to understand one another fully in quality matters.

Engineering the Inspection of Industrial Processes

Nelson G. Meagley,
Willys-Overland Motors, Inc.

The first requirement for engineering the quality from an industrial process is to have a clear definition of the thing we are attempting to engineer. The different quality characteristics of the part have different degrees of importance. Some types are critical and the failure of the manufacturing process to hold every piece within the specification limits could cause failure of the assembly or endanger those using it. Other characteristics can be classified as major and relate to the important functional dimensions where the design can tolerate a small percentage of the production to slightly exceed the specified tolerances, without significant risk of injury to the assembly. The balance of the quality characteristics are minor in importance and relate to the size, shape or other minor dimensions. Good manufacturing practice requires that these be held although rather wide departure from specified toler-

(*Turn to page* 150, *please*)

"Made for Each Other!"

SERVICE PISTON RING SETS BY MUSKEGON ARE DESIGNED FOR A SPECIFIC ENGINE ONLY!

This set of service piston rings was designed and made in the only way it is possible to produce the *finest* rings obtainable! They were designed and made not just for *any* engine, but for a *single* engine only!

They were produced by Muskegon Piston Ring Co. in close collaboration with the car manufacturer*, so that engine and rings are truly "made for each other" and will thus perform with the very maximum of power and economy.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available only through car dealers and other authorized service outlets.

Engine maker and Muskegon, engineered this set of service rings for a single, specific engine.

Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

*Name on request.

ance will not seriously affect the use or value of the part. It is necessary to have full agreement of all responsible parties to a classification of the quality characteristics of the part.

The second requirement is to determine the capability of the processes to hold the tolerances specified; and from this to judge the adequacy of the facilities to produce the part.

Accurate methods for the measurement of process capability have been developed in recent years, principally through statistical techniques of studying the variability of work produced. The average differences in size between consecutive pieces enable us to determine the limits within which 95 per cent or 99.7 per cent, or 68 per cent, or any other stated percentage of the work can be held.

There is a danger, however, that we oversimplify[1] the technique or overestimate our ability to predict the capability of the process. We must clearly understand the statistical principles we are using and the nature of the operation we are measuring.

We must know something about the principal causes for the variability. Some of these are almost completely operator controlled and result from skills and personality traits. We cannot expect to exactly duplicate results between different operators. Other operations have tool wear as the principal cause for variability and the economics of tool change costs becomes the governing facvtor in tolerance. Rearmers, forging dies, and some boring operations are examples.

The process capability estimate is based upon the assumption that the tools are set to produce the most pieces in the middle of the specification. Setting tools at this point is sometimes very difficult due to the variability in pieces used to check the tool setting. An allowance for tool setting must be provided in addition to the natural tolerance of the machine tool.

We have secured agreement among all concerned as to a classification of quality characteristics, and we have determined the tolerance spread required for the processes. The engineering concept of quality control requires that the specified tolerances be wider than the capability of the process. The third point is then to review the tolerances of the specification. If the specification is narrower than the process capability, we must decide between one of two choices, either to change the tolerances or to change the process.

If the tolerances as specified are necessary for the proper functioning of the design, then we must change

(*Turn to page* 152, *please*)

LAPOINTE

NEW 36-inch BROACH SHARPENER for small surface broaches

FEATURES

- Saves floor space: only 84" long, over all.
- TOUCH CONTROL enables operator to remove a minimum of stock . . . prolongs life of the tool.
- Two hand wheels, one to move the table and the other to elevate the grinding head assembly.
- New type (fabric) dust guards for table way.
- Dynamically balanced motorized grinding spindle, mounted on ball bearings on swivel head slide.
- Exceptionally easy moving table and slide, because they roll on ball bearings, mounted between hardened and ground steel ways.
- Vertical slide is of rigid construction, with heavy, adjustable ways.
- Heavy cast iron base for rigidity.
- Also built in 3 other sizes: 60", 72" and 80" capacity between centers.

Write for information on Broach Sharpeners. Ask for Bulletin BS-10.

50 YEARS IN BROACHING! We're the oldest in the world!
1902 • GOLDEN ANNIVERSARY • 1952

We design and build a complete line of standard and special broaching machines, tools and fixtures.

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
Branch Factory: Watford, Herts., England

HUDSON LAPOINTE MASS

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

the process, since we know a considerable percentage of out-of-tolerance work will be produced. We can be quite sure that a major change will be required if the capability study has been properly made. One major change possible is to include a 100 per cent inspection operation as a part of the process, to find the defective pieces we know are being produced.

The only other alternative is to accept work knowing that a significant percentage is outside of tolerance. We have stated that the design cannot tolerate this condition so that we must therefore, avoid accepting this alternative.

The follow through of the tolerance revision program requires the quality control function to be well integrated into the organization. The designer must understand that a tolerance increase will not result in still greater variability of the work. Failure to grant the increase should automatically initiate a retooling program to provide adequate facilities, and additional inspection time should be budgeted for 100 per cent sorting until these new facilities are provided.

The assurance that the process can hold the tolerance does not give assurance that the process will hold the tolerance. There must be a factor of safety to protect the design against the risk that an occasional piece will slightly exceed the limits. These risk factors are similar to the factors of safety used in strength of materials and there should be similar working rules for applying them. We must be able to designate an acceptable quality level (A.Q.L.) stating the percentage of out-of-tolerance pieces we are willing to take, and basing our judgment upon risk considerations of the design.

MACHINERY INDUSTRIES

(*Continued from page* 55)

Engineering Co. has opened a new plant in Euclid, Ohio. Covering 133,000 sq ft of floor area, the plant manufactures electronic equipment and motor drive controls. It also contains laboratories for development work.

Tool Index

Ratio of unfilled orders to the demonstrated production rate for machine tools has dropped to its lowest point since January 1951, according to the National Machine Tool Builders Association; the index for April stands at 15 to one. Not since November 1950 have the machine tool builders experienced an index as low as 294.4 for total new orders this past April. The April shipment index climbed to 309.7 in comparison with the previous month's index of 299.5.

Around the Industry

Birdsboro Steel Foundry & Machine Co. has announced the formation of a new wholly-owned subsidiary, Birdsboro Armorcast, Inc., to make hull and turret castings for tanks. The plant will supply the Chrysler tank plant in Newark, Del.

Lake Erie is currently installing an 1800 ton extrusion press in the Watervliet, N. Y., plant of Allegheny Ludlum Steel Corp. This equipment will be used for the production of alloy steel solid and tubular shapes. It will accommodate billets up to 7½-in. diam and 24-in. long.

Sundstrand International Corp. has been formed by Sundstrand Machine Tool Co. to conduct and promote the export business of the various divisions of the parent company.

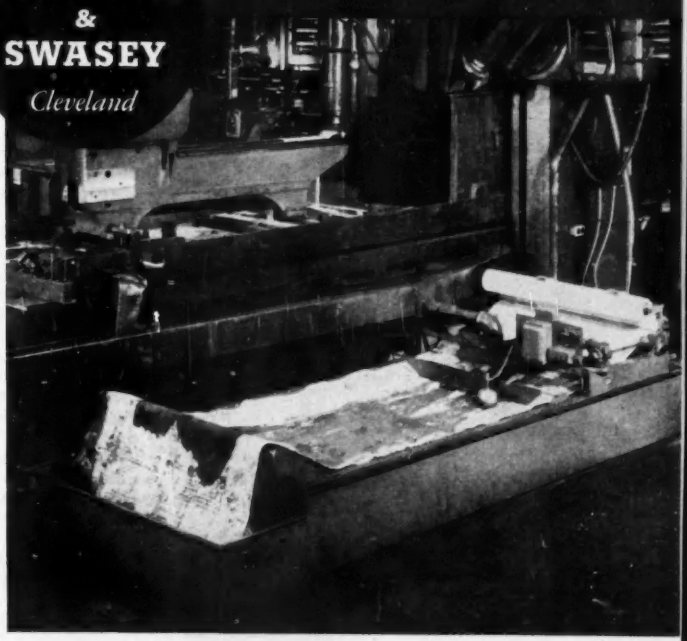
CASE HISTORY

Delpark

INDUSTRIAL FILTERS

SAVE TIME ★ SAVE MONEY ★ SAVE EQUIPMENT

WARNER & SWASEY
Cleveland



• THIS STORY, typical of numerous Delpark case histories, comes from the Warner & Swasey Company, the world's largest manufacturer of turret lathes.

Work scratches on machine ways, caused by grinding wheel particles returning to the work in unfiltered coolant, caused much extra work and reduced vital production. Additional equipment, to increase production, was being considered at a cost of $36,000.

Improvements made through the use of three Delpark Filters increased production to such an extent that plans to purchase additional equipment were cancelled, at a substantial saving in capital investment to the customer. By supplying the grinding wheel with clean, filtered coolant for free, fast-cutting action, production quality was not only increased but expensive down time previously required for sump cleaning was eliminated.

Each filter uses fifty yards of filter material per month at a cost of $6.75 per month for filter material.

This case history is being repeated in numerous industrial plants throughout the country where Delpark Industrial Filters are supplying fine industrial filtering.

Let a Delpark Industrial Filtering Specialist show you the facts on the finest in Industrial Filtration. Write for more complete information.

PATENTS PENDING

Delpark

INDUSTRIAL FILTRATION

Backed by 30 Years Experience in Industrial Filtration

Industry News

(*Continued from page* 23)

NPA Amends Two Metals Orders

The National Production Authority recently amended orders M-82 and M-86 so as to permit distributors of brass mill and copper mill products sold for military, atomic energy, and machine tool programs to compete successfully at the mill level for replacement materials.

Specifically, distributors who filled authorized controlled materials orders bearing A, B, C, E, Z-2, or (the suffix) B-5 symbols can attach the B-5 symbol (reading X-6-B-5) to his own orders to the extent of the military business involved.

Gould National Opens New Mich. Plant

Gould-National Batteries, Inc., has opened a new plant at Monroe, Mich., for the manufacture of batteries for the Air Force and Ordnance Corps. Costing more than $1.1 million, the new plant is part of a $7 million expansion program and will increase the company's productive capacity about 20 per cent.

Production facilities are arranged so that when the demand for military batteries tapers off, commercial automobile batteries can be produced with only minor changes. A new $3 million plant will be opened soon at Kankakee, Ill., and another new operation will start shortly at Fort Erie, Ont., Canada.

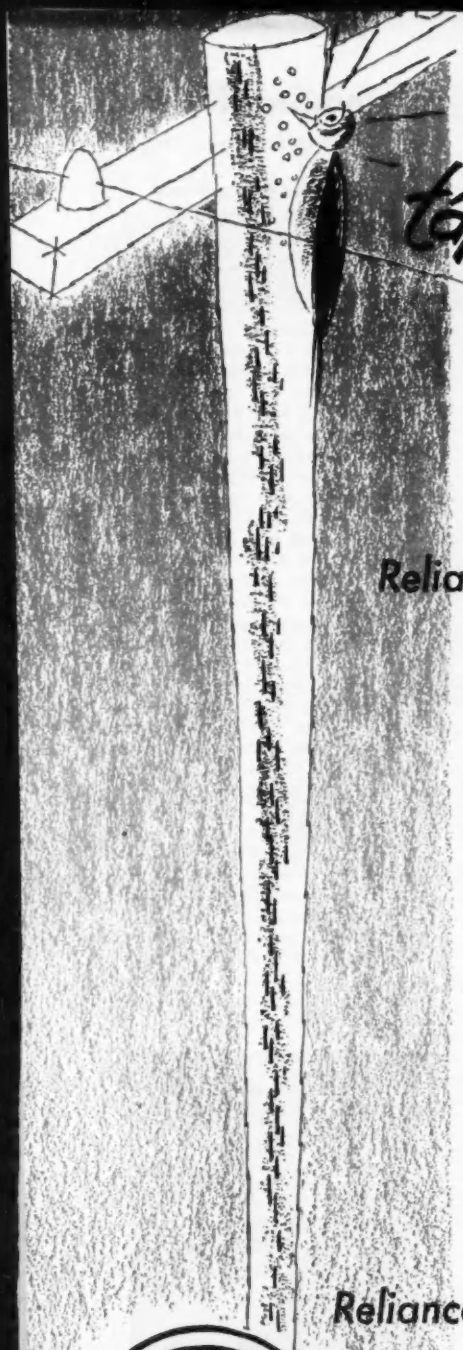
Bendix to Expand Foundry Output

Substantially increased production of magnesium castings for the aircraft industry will result from the recent transfer of the Government-owned Eclipse-Pioneer Foundry of Bendix Aviation Corp. to the Navy, according to the Company.

Built by the Defense Plant Corporation in 1941, the foundry has been operated continuously, under lease, as part of Bendix's Eclipse-Pioneer Div. at Teterboro, N. J. About 10 per cent of its output has been going to the operating company and 90 per cent to other customers.

New machine tools and equipment for the Eclipse-Pioneer Foundry will be acquired by the Navy. It has directed that the expanded foundry output go primarily to meet the aircraft industry's need for magnesium castings.

(*Turn to page* 156, *please*)



Thread tapping is expensive... the old-fashioned way!

You know the costs involved in your thread tapping department—the time consuming operations involved—the consistent scrap rate of improperly threaded parts. Now, Eaton-Reliance offers "thread-cutting" Springtites and Sems to help reduce these production costs.

costs can be cut with Reliance "thread-cutting" (and timesaving) Springtites and Sems!

With Reliance "thread-cutting" Springtites and Sems you can reduce tapping costs and eliminate operations in your assembly work. Simply drill the hole—drive the screw. A 1-2 operation that cuts perfectly mated thread in the material and keeps bolted assemblies tighter longer. Test the advantages of Reliance "thread-cutting" Springtites and Sems—write for samples today, and reduce production costs.

FOR ALL MATERIALS

TYPE 1 for STEEL
Ideal for sheet steels and stainless. Standard machine screw threads plus Reliance lock washer for stronger, tighter fastenings.

TYPE 23 FOR DIE CASTINGS
Specially designed for die castings and metals that powder when driven. Standard machine screw thread and Reliance lock washer for exceptional tightness.

TYPE 25
For every type of Plastics assembly, Type 25 features spaced threads to keep stripping to a minimum.

Write today for your free copy of Bulletin S49A that describes Reliance "thread-cutting" Springtites and Sems

Reliance "thread-cutting" springtites and sems

EATON MANUFACTURING COMPANY, RELIANCE DIVISION

OFFICE AND PLANTS • MASSILLON, OHIO

SALES OFFICES: NEW YORK • CLEVELAND • DETROIT • CHICAGO • ST. LOUIS
SAN FRANCISCO • MONTREAL

Industry News

(*Continued from page* 154)

Chrysler Reconditions 100,000 Small Tools

To cut costs and conserve scarce metals, Chrysler Corp. in the past year has reconditioned and put back into service more than 100,000 hand tools and high-service small tools, such as drills and reamers, extending their useful life several times beyond the normal span.

Some of the tools are reworked to new specifications, some are issued to different departments where they still can be utilized effectively for other purposes, and some are sold to suppliers who can use them in their operations. Those that are beyond economical repair are turned in to the company's scrap drive program.

An example of how the program works is the reworking of a 9/16-in. drill to ½ in. to meet specifications for aonther job. Old worn drills too short for the original operation are sharpened and used on another operation. Carbide turning tools which have been worn down to short stubs are returned to original length by welding on a steel shank.

All tool purchase requisitions are routed through the non-productive Material Control Dept., which checks to see if any tools in the obsolete stock bins can be utilized. If a tool is available that can be reworked to meet job requirements at not more than half the cost of a new one, or if a tool from another job can be satisfactorily substituted, it is supplied to the plant requesting it.

TOOL TESTING

Spark-testing of worn-out tools tells an experienced workman its type of metal, so that tools can be separated into 25 different classifications for systematic scrappage. Only unsalvageables are scrapped.

(*Turn to page* 158, *please*)

STANDARD

THROUGH THE YEARS

Pioneered and perfected by Aetna, the T-Type Bearing is the Nation's No. 1 bearing for the clutch release position. It is original equipment in more than half of the "on-and-off-the-highway" mobile vehicles built today. Add this bearing's 18-year leadership to its matchless features — to Aetna's traditional practice of cooperative research and engineering — to Aetna's ultra-strict quality control methods and manufacturing skill and you have every significant reason why Aetna is the recognized source of the world's finest clutch release bearings. Aetna Ball and Roller Bearing Company, 4600 Schubert Avenue, Chicago 39, Illinois.
IN DETROIT—SAM T. KELLER—2457 WOODWARD AVE.

Aetna T-TYPE CLUTCH RELEASE BEARINGS

Industry News

(*Continued from page* 156)

Installment Buying High in Automobile Purchases

Sixty per cent of the used cars and 45.7 per cent of the new cars purchased from 1949 through 1951 were bought on credit, according to the American Finance Conference.

A comparison of unit credit sales shows that the used car purchaser is far more dependent on installment credit as the means of paying for his transportation than is the new car buyer. For every new car sold on installments, 2.07 used cars are sold on installments.

During the six years from 1946 through 1951, a total of $31.5 billion in installment credit was extended to individual purchasers of passenger cars in the U. S., $16.5 billion for the financing of new car purchases and $15 billion for financing used cars.

Ford of Canada Plant to Operate Next Year

Ford Motor Co. of Canada, Ltd., is expected to start limited operations at the assembly plant which is under construction at Oakville, Ont., by the early summer of 1953. It is predicted that the plant, at top capacity, will employ between 4000 and 5000 persons.

American Electro to Conduct Powder Metallurgy Seminar

American Electro Metal Corp. has invited a number of leading U. S. and European powder metallurgists, as well as physicists and chemists, to a seminar in Reutte, Tyrol, June 22 to 26. U. S. companies to be represented include the following: Bendix Aviation Corp., Chrysler Corp. and Thompson Products, Inc.

Erratum

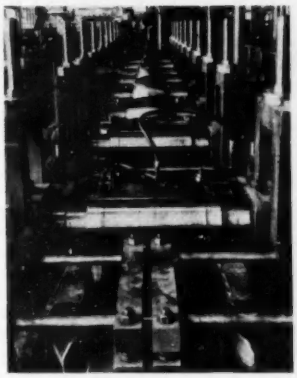
In the article entitled "Testing Automotive Equipment Under Severe Arctic Conditions" appearing on p. 35 of the April issue of this publication, it was stated that the engine heating equipment was developed in cooperation with Stewart Warner Corp.

The statement was partially incorrect in that the particular heating equipment discussed was developed with the aid of Perfection Stove Co. However, Stewart-Warner and other companies also are cooperating in the development of automotive heating devices being tested by the Ordnance Corps in Alaska.

(*Turn to page* 163, *please*)

Industry News

(*Continued from page* 158)



FORD STEEL TUBE MILLS

The rolls of this giant tube-mill machine pull and form coiled steel into rear axle housings at Ford Motor Co.'s Mound Road, Detroit, Mich., plant. Two mills, designed for quick conversion to defense production, are in operation.

Hillman Minxs Score in Mexican Contest

A team of stock Hillman Minx sedans finished second, sixth, and seventh out of 27 starters in the recent First National Mexico City to Puebla Race.

The 80-mile handicap race was run over rugged and tortuous mountain roads at high altitude, rising from 7500 ft in Mexico City to 10,700 ft through the mountains. The official average speed for the leading Hillman Minx was 71.42 mph.

Doman Ready to Construct Commercial Helicopters

Doman Helicopters, Inc., recently announced that it will accept commercial orders for its transport-type helicopters. The company is making available to commercial users a seven-seat counterpart of its YH-31 helicopter now being produced for the Army.

Acme Steel Building New Plant in Canada

Preliminary construction recently began on a $980,000 plant at Scarborough, Ont., for Acme Steel Co. of Canada, Ltd.

Expected to be completed by late fall, the Scarborough Works will manufacture flat steel strapping and seals for container reinforcement. The building and adjacent heating plant will cover 30,000 sq ft of floor space.

MEN *in the* NEWS

(*Continued from page* 112

Fansteel Metallurgical Corp.—**Robert J. Aitchison** has been elected chairman of the board, with **Dr. Frank H. Driggs** as president, **Dr. R. Winchester** as director of the Technical Div., **Glen Ramsey** as vice president, and **John Meade** as vice president in charge of industrial relations.

Chrysler Corp.—**Robert T. Keller** has been named general manager of tank manufacturing operations, while **Thomas F. Morrow** is now works manager of the Detroit tank operation.

Lear, Inc.—**Clarence J. Reese** and **Joseph H. McMullen** were recently elected directors.

M. W. Kellog Co.—**Paul F. Swanson** has been named manager of the Process Engineering Dept.

Ford Motor Co., Lincoln-Mercury Div.—**Oscar L. Carlson** has been promoted to regional Lincoln sales manager, while **Neil A. Wick** succeeds him as regional service manager.

Fruehauf Trailer Co.—**D. J. Harker** has been named personnel director of the Avon, O., plant.

Townsend Co., Western Div.—**Edward C. Sterling, Jr.,** was recently chosen sales manager.

Vulcan Rubber Products, Inc.—**Edward C. Hemes** was recently elected a director and executive vice president.

Goodyear Aircraft Corp., Sales Div.—**John R. Stair** has been appointed contract administrator in the Government Projects Dept.

Joy Manufacturing Co.—**William L. Wearly** has become general sales vice president.

International Nickel Co., Inc.—**Ransom Cooper, Jr.,** has been named manager of the Nickel Sales Dept., while **H. D. Tietz** now heads the Inco Nickel Alloys Dept.

Norton Behr-Manning Overseas, Inc.—**David B. Tyler** has been placed in charge of foreign advertising.

Evans Products Co.—**Dan Olson** recently became assistant advertising manager.

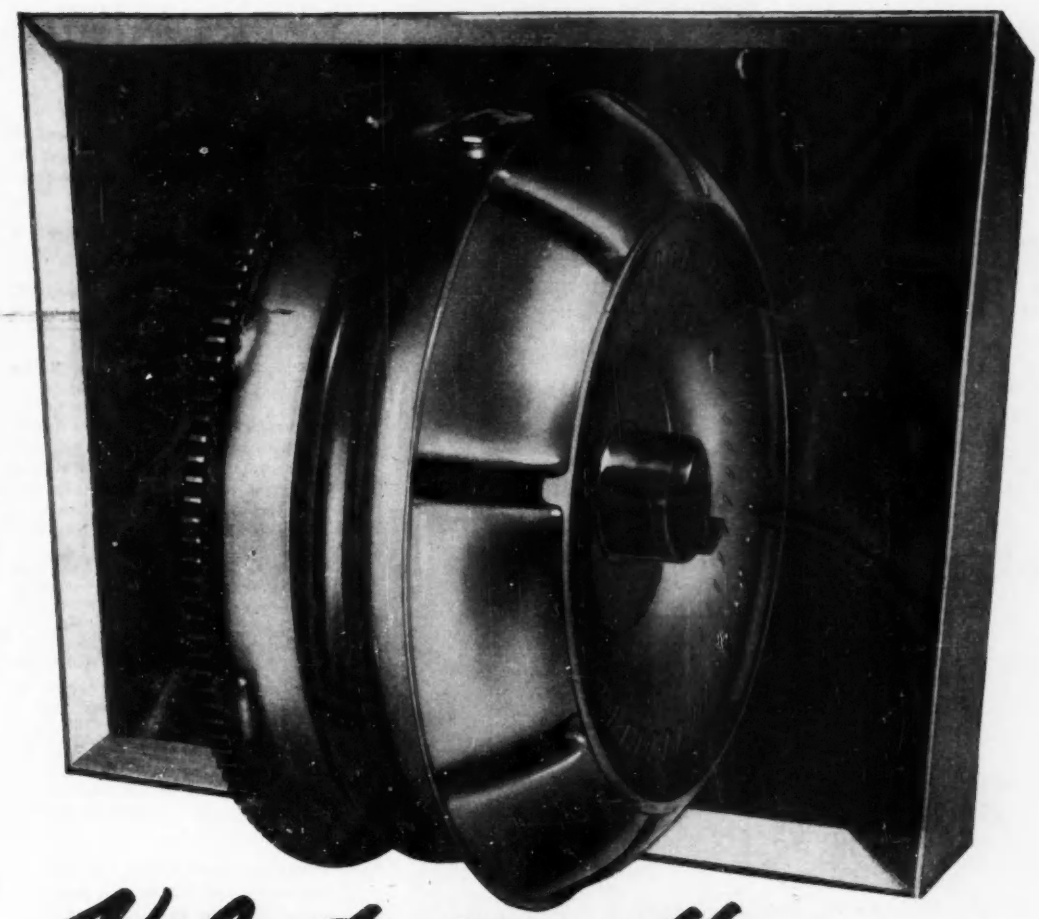
National Automotive Fibres, Inc.—**Harvey B. Greene** has been named secretary and treasurer.

Westinghouse Electric Corp., Motor and Control Div.—**Frank P. Taugher** has been chosen assistant to the vice president, while **D. L. Pierce** has been placed in charge of the Industrial Control Engineering Dept.

Wellman Bronze & Aluminum Co.—**James M. Robertson** is now chief chemist in charge of quality control. **Robert C. Boehm** has become chief metallurgist, while **Robert W. Spacek** has been named assistant production manager.

Chicago Rivet & Machine Co.—**Edward J. Morrissey** was recently elected president and general manager, while **Edward P. O'Malley, A. J. Dunsmore,** and **John A. Kelly** have been chosen secretary and vice president in charge of production, vice president in charge of sales, and treasurer, respectively.

(*Turn to page* 166, *please*)



Velvet smooth performance

Long torque converters offer the automotive manufacturer important advantages in design, performance and cost.

Power transfer is smooth—*dependably* smooth—torque multiplication of better than 2 to 1 at stall. The converter is direct air-cooled for simplicity and trouble-free service.

Assembly units are fabricated almost entirely from stampings, for low-cost manufacture.

LONG MANUFACTURING DIVISION
Borg-Warner Corporation
DETROIT 12, and WINDSOR, ONT.

ENGINEERING B-W PRODUCTION

LONG

CLUTCHES • RADIATORS • TORQUE CONVERTERS
OIL COOLERS

MEN *in the* NEWS

(*Continued from page* 164)

General Motors Corp., Oldsmobile Div.—**B. N. Barber** and **James E. Straud** have been appointed assistant sales managers.

Vanadium Corp. — **Gustav Laub** is now a director.

Harry Ferguson, Inc. — **Curry W. Stoup** was recently made vice president.

Evans Products Co.—**F. A. Keihn** has been elected a vice president.

Micromatic Hone Corp. — **Gerald Carlisle** has been appointed treasurer to succeed **A. J. Prentice**, while **Paul E. Curran** and **William E. Long** are now secretary and assistant treasurer and assistant secretary, respectively.

General Motors Corp., Fabricast Div.—**George A. Zink** was recently named general manager.

General Motors Corp.—**Kenneth A. Meade** has been named to direct overall educational relations activities of the Dept. of Public Relations.

American Brake Shoe Co.—**John D. Hinton** is now assistant manager of equipment sales, while **Richard L. Berry** heads ABK laminated plastic sales.

Allis-Chalmers Manufacturing Co., Tractor Div.—**A. E. Dorn** was recently named industrial sales manager.

Solar Aircraft Co., Research Products Div.—**Elliott C. Bacon** has been chosn assistant manager.

Cushman Chuck Co.—**Harry W. Hultgren** has retired from his position as sales manager to become sales consultant.

Caterpillar Tractor Co.—**William H. Franklin** has been elected a vice president, and **A. N. Whitlock** succeeds him as controller.

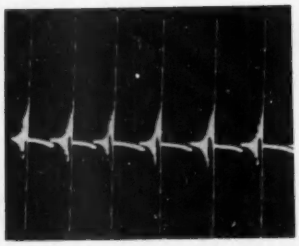
Willys-Overland Motors, Inc.—**Don H. Smith** is now manager of advertising and merchandising.

Lear, Inc.—**A. G. Handschumacher** is now director of sales, **Andrew F. Haiduck**, general manager of the Grand Rapids Div., and **Harold C. Andrus**, general manager of the Lear-Romec Div., with **LeRoy Barr** assistant general manager.

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page 64*)



Normal diagram-battery and coil ignition.

tion discharge, which reaches a high amperage for a very short time, is the only part of the ignition wave that causes the sweep to be triggered.

Special controls are provided which cut off or stop the horizontal sweep from either or both ends thus permitting the selecting of any portion of the diagram that it is desired to view. Rotating these controls together permits the examination of every impulse in firing order of engine.

Vertical movements on the cathode ray tube are made by connecting the vertical deflection plates to the primary circuit of the ignition system at the breaker points and measuring or indicating the voltage to ground. The interpretations of the diagrams are made by observance of the height and frequency of these voltage oscillations.

Electronic checking of ignition systems is accomplished by attaching the two leads just described to the ignition system. One lead from a spark plug is connected to the horizontal sweep circuit for timing the instrument. The other connection is made at the primary breaker points. This latter connection permits the observance of all ignition voltage and frequency changes. The only other connections required are for grounding the instrument to the vehicle. This type of instrumentation is adaptable to any type of ignition system used on either commercial or military vehicles. Battery and coil systems of 6-24 v, magneto systems and shielded and sealed systems can be checked. Different pick-ups with suitable connections are required for sealed and shielded systems. *Hastings Manufacturing Co.*

Circle P-9 on page 65 for more data

ARMY HIGH SPEED TRACTOR. A powerful, heavy duty 38-ton mover developed for the military by Allis-Chalmers. South Wind "winterized." A "978" heater keeps frost off the windshield . . . freezing cold outside the cab.

NEWEST ARMY VEHICLES "WINTERIZED" AGAINST SUB-ZERO COLD

Amazing New Military Heater Keeps Vehicles Warm Even at 70 Below!

Now ready to roll. Specially equipped to keep rolling under the severest weather conditions! These new Army vehicles boast increased personnel comfort, greater efficiency in sub-zero cold—all the results of an amazing new military heater: the South Wind "978."

Simplified in design. Compact. This rugged forced air heater preheats, heats, and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat or engine operation.

Built to Army Ordnance specifications, the "978" has been standardized by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in fashioning future designs for commercial car heating, too.

ACT NOW: Find out how this revolutionary new "978" military heater can effectively answer *your* vehicle heating and engine pre-heating requirements. Get the experienced counsel of a trained field engineer. Wire, write or phone Stewart-Warner Corporation, South Wind Division, 1514 Drover Street, Indianapolis 7, Indiana. Do it today.

STEWART-WARNER *South Wind* REG. U. S. PAT. OFF.

PERSONNEL HEATING
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

MIGHTY MOVER. The Army M4, 18-ton heated high speed tractor. A South Wind "978" heater dependably introduces fresh air to keep windshields completely frost-free, cab and personnel comfortably warm.

SELF-PROPELLED artillery. New M41 Motor Carriage with 155mm. Howitzer. Equipped with two South Wind "978's" for personnel heating, and for heating gun components.

The Fastest Five Hundred

(*Continued from page* 47)

lighter cars, as might normally be expected, were a lot easier on tires than cars which weighed even as little as 200 lb more. At least that was true of several cars in the first ten.

Contrasted with this was the experience of the Cummins Diesel driven by Freddie Agabashian. It ran 40 odd laps in serious contention (fifth, most of time) before requiring tires and it was the heaviest car in the race (see table, page 46). Incidentally, this car put up a very competent performance, appearing to run smoothly and well without being unduly extended.

Another victim of the fortunes (or misfortunes) of racing was Alberto Ascari, whose Ferrari was retired on its 40th lap when a wheel collapsed, precipitating a spin into the infield. Ascari was uninjured, but what had begun to appear as a very promising bid was closed out prematurely.

Ascari, who obviously is a very serious competitor with a sound and studied style, was the only driver who succeeded in qualifying one of the four Ferraris entered. On this performance alone he rates earnest consideration for any future appearances he might make on this continent.

The technical angles of the 1952 race hold more interest than they have for many previous years. The most significant, if not actually amazing, technical story is the durability of the cars. The phrase "Running at Finish—Flagged" has not been seen very often in the box scores of postwar 500 mile races. This year it shows in numerous instances and a total of 14 cars actually completed the 200 laps.

Most singular aspect of this performance record is that not a single case of actual engine failure occurred, so far as could be determined by a personal investigation made May 31. In 1951 there were at least six very ugly and complete engine failures. In fact they could have been called cases of engine destruction outright.

Yet, to puzzle and confound the observer, the speeds this year were considerably higher. The qualifying average of the field in this year's race was just about 135 mph. The race leaders were running almost that fast throughout the event, but no

(*Turn to page* 172, *please*)

Car Operation Depends on the Drive Train . . .

. . . and the Drive Train Depends on the Universal Joints

No car can operate at its best unless the drive train is functioning efficiently. And satisfactory performance of the entire drive train depends upon the universal joints. "DETROIT" Universal Joints have kept pace with car design . . . are built to take the extra loads placed upon them by today's high compression engines.

Result: "Detroit's" smoother operating Joints Produce Smoother Rides.

Detroit  **UNIVERSAL JOINTS**

UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan

The Fastest Five Hundred

(*Continued from page* 170)

parts let go in the engines, so far as we know.

A possible answer to the improvement lies in a rule change which permitted the entrants to run different gears for the race than for qualifying. This change, which was made following the 1951 race, *could* account for the better reliability of this year's engines. There really is no way to prove this, but *something* helped.

Another rather pointed interest angle lies in the way car weights have been coming down. Numerous new cars appeared this year in which overall dry weight has been brought down to 1600 lb, to use round numbers. An example of this trend is the Fuel Injection Special driven by Bill Vukovich. The winning Agajinian Special driven by Troy Ruttman is not much heavier. The fourth place Belanger Special driven by Duane Carter is another lightweight car. Sam Hanks' Bardahl Special, which finished third, is 150 plus pounds heavier than any of the above three.

Front drives, under the present conditions, appear to be on the way out. As built up to now they are bound to be rather heavier than the light-type rear drives. Also, even at equal weights, the front drives will wear tires faster than well designed rear drives, based on past experiences, at least.

Although permitted by the rules, supercharged engines do not appear favorable for competition at Indianapolis in the light of recent race results. The matter of durability in many cases becomes a function of the total number of parts in a unit. On this ground alone the supercharged engine does not bear lengthy examination.

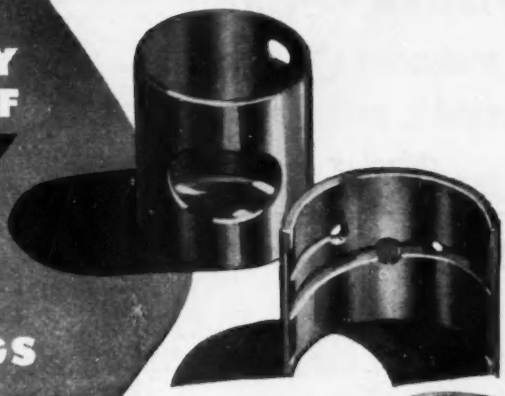
Independent suspension still is used on quite a few cars but it is significantly missing on the newest designs brought to Indianapolis this year. Perhaps the main reason for this choice is the new rather universal belief among racing drivers and mechanics that fixed suspension is more favorable for dirt track use than the independent designs.

Fuel practices at Indianapolis are tending to become standardized again. Methanol base fuels are now used almost universally and in most cases

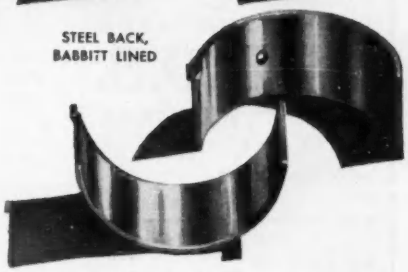
(*Turn to page* 174, *please*)

JOHNSON BRONZE

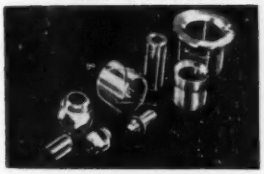
THE ONLY MAKER OF EVERY TYPE OF SLEEVE BEARINGS



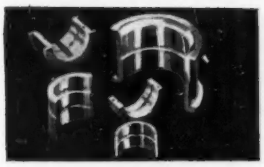
STEEL BACK, BABBITT LINED



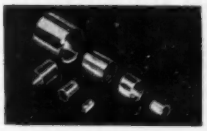
LEDALOYL—POWDER METALLURGY



CAST BRONZE



ALUMINUM ALLOY

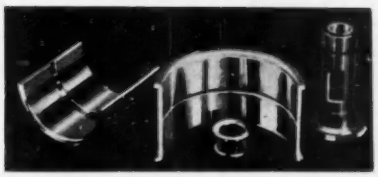


BRONZE-ON-STEEL COPPER ALLOY

This is the only time in history that any one manufacturer has been equipped to produce *all* types of sleeve bearings. This complete service in Johnson Sleeve Bearings means uniform high quality and a dependable source of supply for you.

JOHNSON BRONZE COMPANY

625 South Mill Street • New Castle, Pennsylvania



BRONZE BACK BABBITT LINED

SLEEVE BEARING HEADQUARTERS SINCE 1901

JOHNSON JB BEARINGS

Sleeve-Type

The Fastest Five Hundred

(*Continued from page* 172)

are laced with "nitro" for qualifying. Fuel injection apparatus is the almost unanimous choice for the race itself as well as for qualifying.

This year, although the Monroe shock absorber people came in for the first time and established installations on a number of cars, the overall emphasis on shock absorbers which has been in evidence for the past couple of years has appeared to have cooled off a bit.

A Bendix Ignition Analyzer appeared around the garages this year and advantage of its presence was taken by several mechanics and owners with satisfactory results.

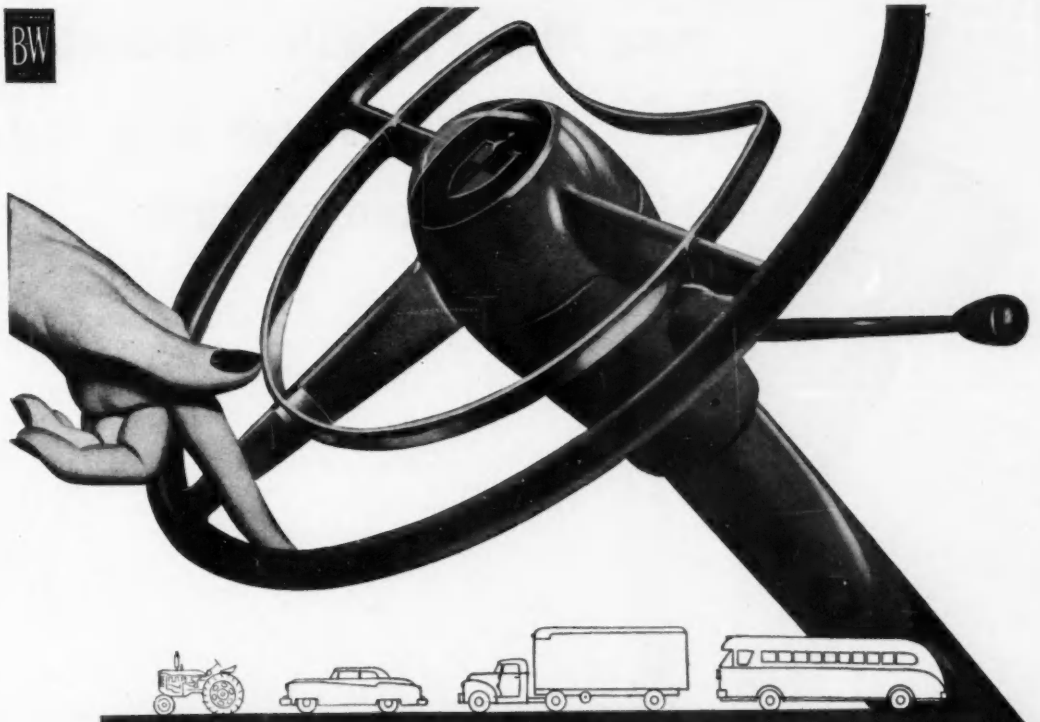
The 1952 race will stand out prominently in the annals of Indianapolis 500 milers as a bonanza year for technical improvement. That this statement can be made in the face of another sizable increase in race speeds is remarkable and satisfying.

The safety record also received another clean slate for 1952 in spite of the higher speeds. It always is a real pleasure to report that there were no serious accidents, no personal injuries to contestants, and only one or two minor injuries among the pit crews. As a matter of pleasant fact, there were no seriously-damaged racing cars either, or at least none which appeared to be. The Fuel Injection Special driven by Bill Vukovich probably sustained misalignment sprains of some consequence but the visible damage was slight. This was also true of Ascari's Ferrari.

As for organization, it is only fair to record the fact that the 1952 start was rather ragged but still outstanding. Again the weather was perfect and the handling of the noticeably record-breaking throng of spectators was well done.

The writer gratefully acknowledges the cooperation extended by and information received from Messrs. Powell, Silberman, Rigsbee, and Oldfield, of AAA Technical Committee and the Timing and Scoring Group.

BW



NOW FINGER-TIP STEERING!

. . . with PESCO HYDRAULIC PUMPS

Right now, many Americans are enjoying the thrill of hydraulic power steering for the first time. Complete and absolute control of the vehicle is obtained at all times . . . perfect safety, even on soft shoulders or in case of a blowout. Now, just the touch of a finger to the wheel, at any speed, and the vehicle responds surely and easily.

Less driver fatigue and increased pay loads for truckers are just two of the many benefits of hydraulic power steering.

Pesco engineers have worked hand in hand with automotive engineers in the development of a pump for this unit, which is one more in a long series of important developments in the field of *pressurized power and controlled flow*.

Investigate the advantages of hydraulic power steering for the vehicles you manufacture. Perhaps Pesco's experience can be helpful to you. Why not call us?

New Pesco Hydraulic Power Steering unit for passenger cars consists of pump and reservoir.

engineering Pesco production

PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD • BEDFORD, OHIO

How Mallory Contact Assembly facilities can help you ...and cut costs

If you are now designing and manufacturing your own electrical contact assemblies, Mallory assembly engineering can simplify your production problems. Here's a typical example of how Mallory saves manufacturers time, trouble and money.

The components of this contact assembly for an aircraft power control unit formerly had to travel a complicated path between many suppliers. First, a copper blank was purchased from one source and sent to Mallory for brazing of the contact. Plate and braid, from another supplier, went with the brazed blank for assembly brazing in a fourth shop. A fifth supplier silver-plated the assembly.

Mallory now produces the complete assembly from start to finish. Quality is higher, and production costs are lower. The customer's problems of scheduling, reshipment, storage of components and divided responsibility are entirely eliminated.

EXPECT MORE...GET MORE FROM MALLORY

Here's what Mallory has to offer on your contact assembly work:

DESIGN EXPERIENCE . . . based on Mallory's engineering of more than 5000 types of contacts.

SPECIALIZED METALLURGICAL KNOWLEDGE . . . through consistent leadership in the development of powdered metals and special alloys for electrical contact service.

ADVANCED TECHNIQUES . . . for spot welding, brazing to provide full-area bonding of the contact to the backing material, and other specialized assembly methods which cut manufacturing costs and improve performance.

COMPLETE PRODUCTION FACILITIES . . . a recently expanded plant geared to high production and prompt delivery.

It will pay you to investigate Mallory assembly engineering, whether your contact assemblies are now in production or still on the drawing board. Write to us today.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

P R MALLORY & CO Inc

MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators
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More power to you!

In the vital electrical equipment industry, as in practically all other fields, the uses for OSTUCO Tubing are countless. Transformer and header tubes, columns, bushings, bearings, housings, and mounts are only a few of the specific applications in generators, motors, starters, power equipment, and many other electrical products that mean power to you.

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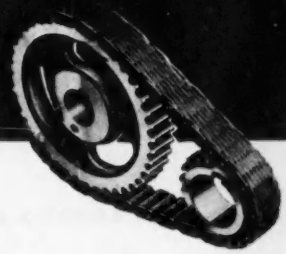
Morse *means* Timing Chains



When you buy Morse Timing Chain Drives, you buy accurate, trouble-free performance, *proved* in over 54 million Morse-designed, Morse-built timing chain drives.

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This reproduction of a copper engraving of the 1780's shows a gentleman calling on his lady by raising seat of his elevator-carriage to her first-floor window. This was an early attempt to solve a material-handling need that would be better answered by today's hydraulic lift truck.

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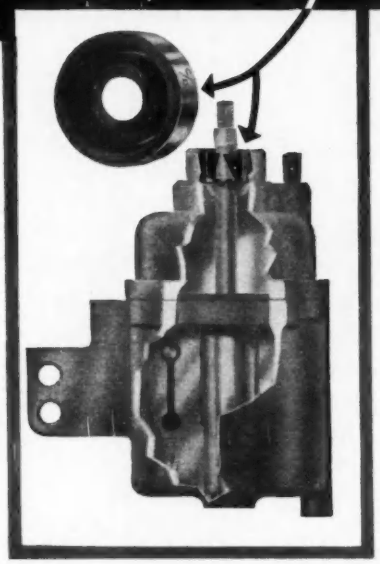

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Tap the keys . . . pull the lever . . . tap the keys . . . pull the lever . . . hour after hour, day after day, throughout the world, deft fingers speed the mathematics of business and industry with R. C. Allen portable adding machines. Every machine must be consistently accurate. To achieve such dependable accuracy, the intricate mechanism of R. C. Allen machines must be protected against the shock of the continual pull and release of the hand lever. This is accomplished by cushioning the force of the lever with an oil compression governor. To positively seal the oil in and dirt out, R. C. Allen relies on C/R Sirvene "Perfect" oil seals.

Solving tough or unusual sealing problems is C/R's specialty. That's why more automobiles, more agricultural and industrial machines are relying on C/R than any other sealing device.

P. S. For immediate delivery, C/R "Perfect" oil seals are stocked in over 1800 sizes covering 15 different types.

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Mechanical Leather Products
Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.

SIRVENE
The Scientifically Compounded Elastomer
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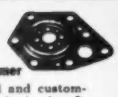

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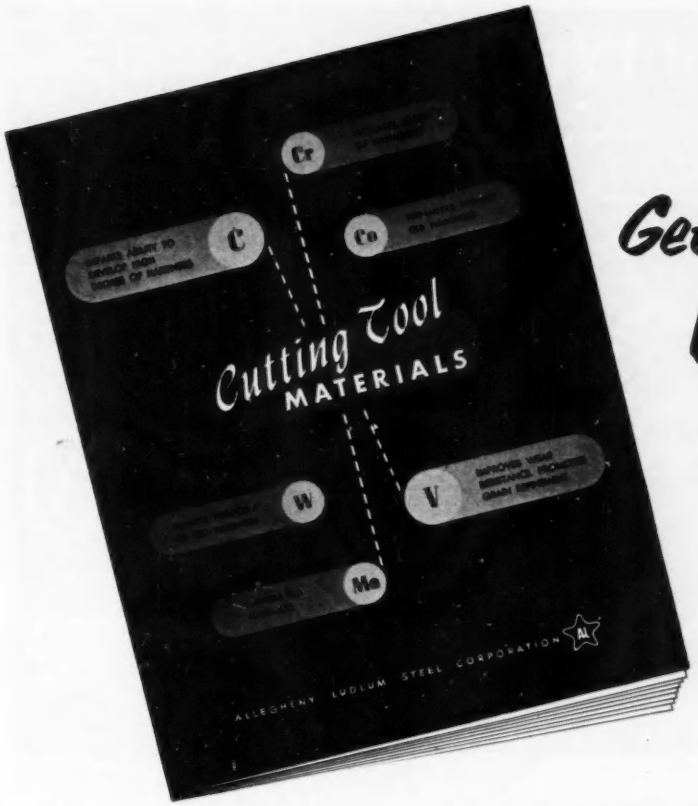

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By "complete" is meant that Allegheny Ludlum produces the full range of modern cutting tool materials, hence is in position to know and recommend the type best suited for any stated purpose. Unbiased content makes the 8½" x 11" booklet, shown, all the more valuable. Specify its title, "Cutting Tool Materials."

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You should have a personal copy of this 36-page booklet close at hand, if you are continually running into new cutting problems. Use it as a guide to quick answers to scores of possible questions such as:

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This booklet in no way replaces, but does supplement, what you can learn by practical experience or what you can gain by calling in an A-L tool engineer. In compact form and quite impartially, the booklet presents the basic facts that enable you to speedily compare the suitability of various tool materials for specific uses. *Send today for your free copy.* There is no obligation involved.

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SINCE 1854

The SOFT Acting Clutch with the SURE GRIP!

. . . just like a Hand of Steel in a Velvet Glove

The hand of steel in the Lipe Clutch has 20 fingers that equalize the pressure of a single spring—assuring softer engagement and positive grip.

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Lipe's soft-engagement, positive-grip Multi-Lever Clutch never needs babying. It engages smoothly—without grab, shock or jerk. All parts of the pressure plate touch at the *same instant* with the *same* pressure. There's no cocking—no point of high slippage and spot burning.
Result: *More mileage between tear-downs.*

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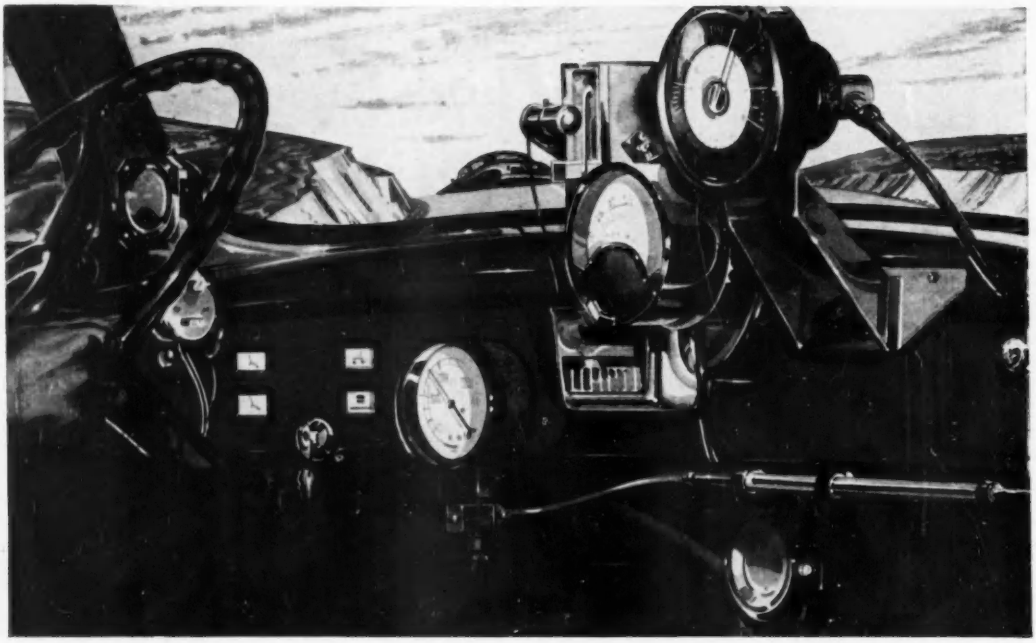

TOMORROW'S STOPS START HERE . . . TODAY!

What is the automotive industry going to want in brake lining for tomorrow's vehicles? How fast will they want them to decelerate? What temperatures will be created? How will they apply pressure . . . and how much?

Academic questions? Not at Brakeblok. It has been our policy, for years, to look for tomorrow's answers . . . today.

Our test fleet, for example, is equipped with specially designed instruments that will give us a complete history of any frictional material, under actual driving conditions. We can determine: rates of deceleration; pedal and line pressures; stopping distances at various speeds; effects of resultant temperatures; brake effectiveness and other pertinent data.

We can determine what material or combination of materials will work best to save you time, work and money.

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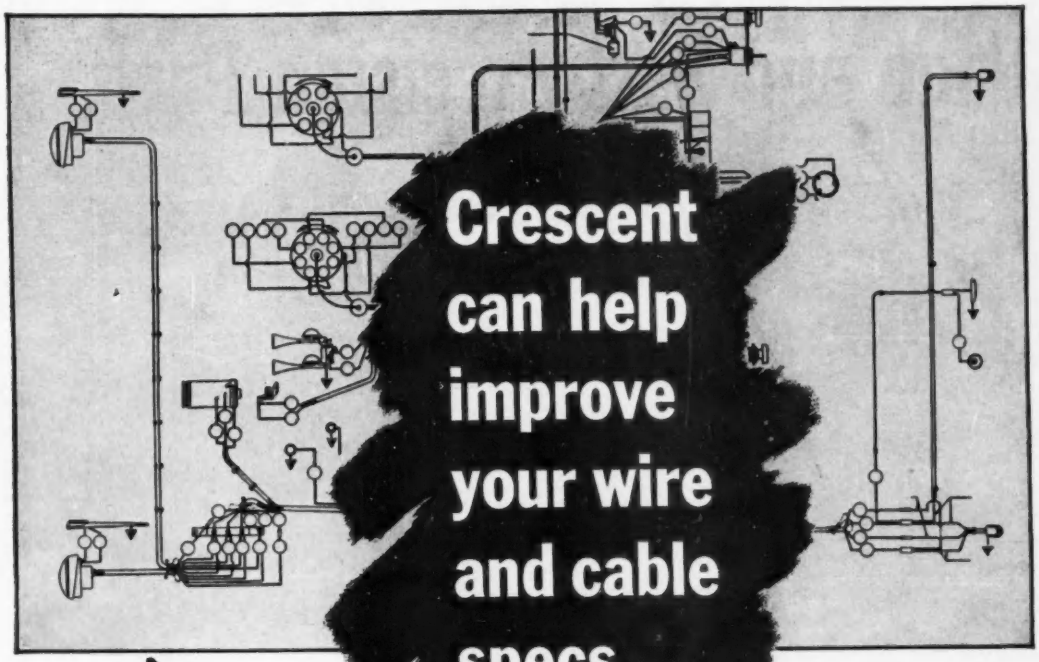
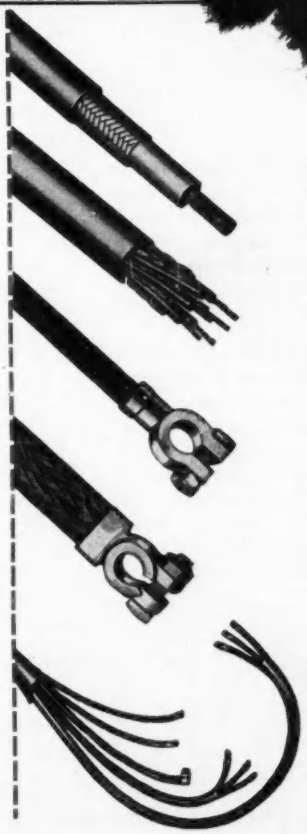
BRAKE LINING

AMERICAN Brake Shoe COMPANY

AMERICAN BRAKEBLOK DIVISION
DETROIT 9, MICHIGAN



Crescent can help improve your wire and cable specs...



Through engineering cooperation with manufacturers of automobiles, buses, trucks, trailers, aircraft, tractors, industrial and farm power-equipment, Crescent has made important contributions to the improvement of wire and cable specifications. These improved specs mean worthwhile savings in assembly costs as well as increased efficiency in starting, lighting, and ignition systems.

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We invite you to discuss the advantages of integrating your engineering with ours. No obligation, of course.

THE CRESCENT COMPANY, INC., PAWTUCKET, RHODE ISLAND

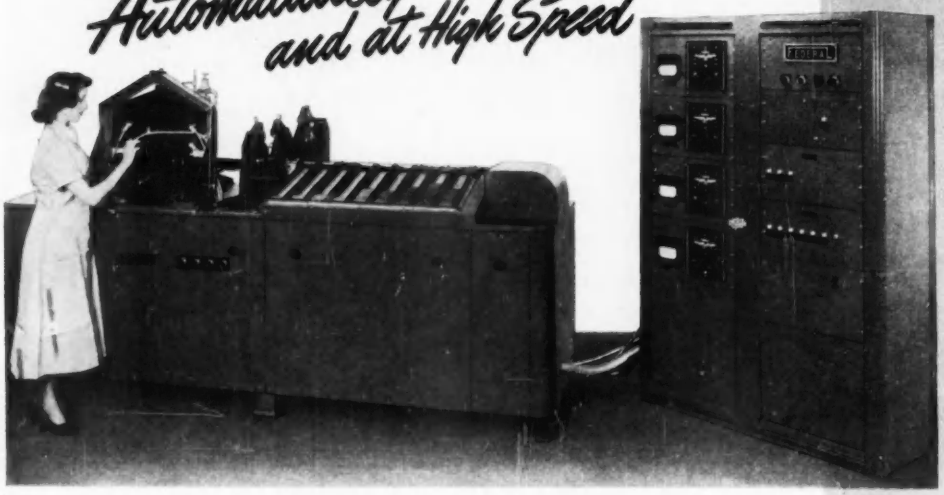
CRESCENT

Wiry Joe

AUTOMOTIVE WIRE AND CABLE

Gage and Sort Precision Parts

Automatically and at High Speed



At a speed of 3,000 plus per hour this conveyor-fed multi-inspection gage measures and sorts piston pins for hardness, triangular out-of-round, taper and diameter along the full length of the workpiece. The pins are automatically sorted into ten disposal units: out-of-round, tolerance .00005"; taper, tolerance .0001"; hardness, O.K. and "bad"; diameter, five groups of .0001" difference, plus over and under.

The final inspection and sorting of mass-produced, similar parts is automatically accomplished by Federal Gaging and Sorting. These gages, made in various types to perform specific tasks, do their work automatically with uncanny precision and speed. Federal Automatic Gages reduce to the minimum non-productive inspection time, effect substantial savings in subsequent assembly, and eliminate useless machining of outsized pieces finally discarded as scrap.

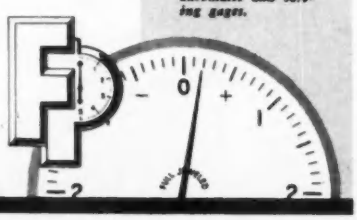
The speed of automatic gaging is limited only by the speed of mechanical handling of the workpieces; parts can be gaged much faster than is required for all practical purposes. As for accuracy, extremely high magnifications can be provided, with scales graduated in millionths or, when necessary, fairly low magnification and long range. Practically any dimension or several dimensions or dimensional conditions can be gaged by Federal Automatic Sorting Gages.

We have had extensive experience in the design and manufacture of high speed automatic and sorting gages and can recommend equipment to answer your particular needs. Write us for information on all types of automatic gages including multi-dimension, continuous measuring, machine control and automatic sorting gages. Federal Products Corporation, 1266 Eddy Street, Providence, R. I.

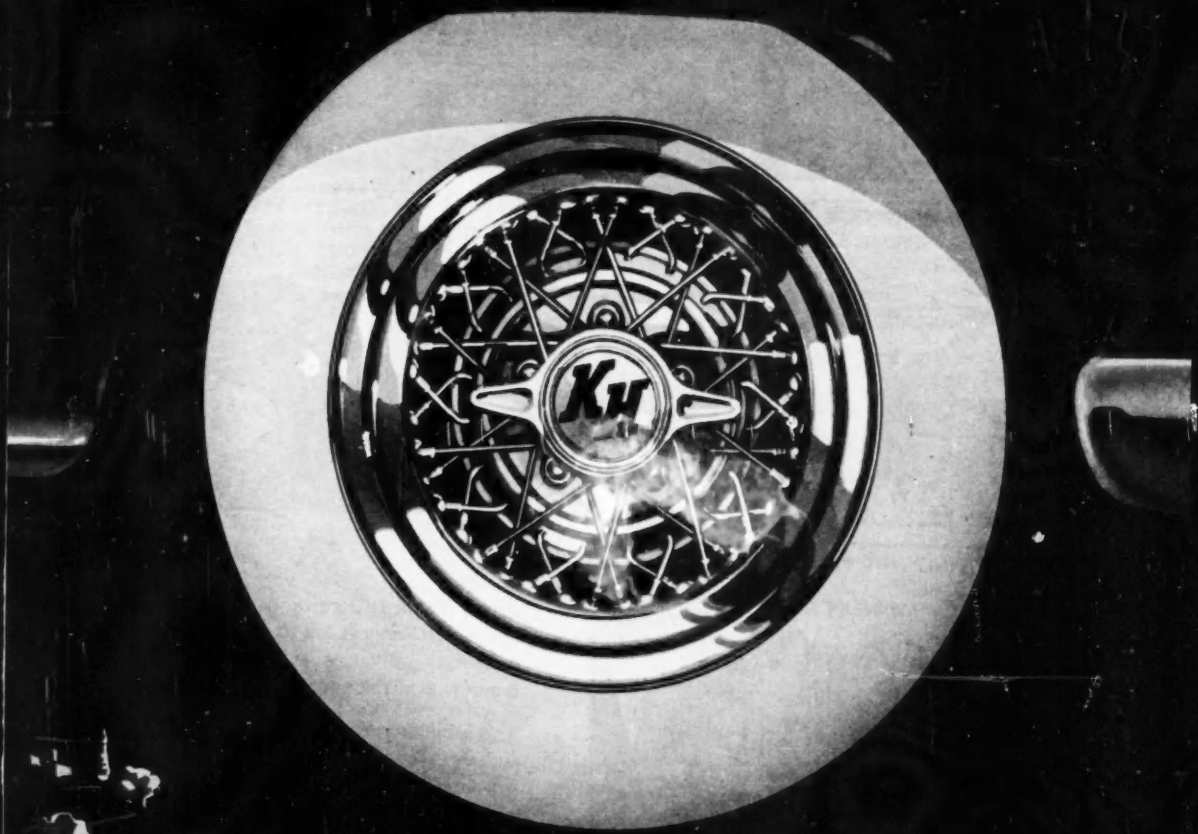
A few of the many dimensional inspections possible with automatic and sorting gages.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES



KELSEY-HAYES



KELSEY-HAYES WHEEL COMPANY

DETROIT 32, MICHIGAN

PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.
PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

The Crankshaft
—backbone of the internal combustion engine.

Modern Trends—more r.p.m.'s, higher compression ratios, more power per cubic inch of displacement—all lend additional emphasis to the importance of crankshaft quality.

Wyman-Gordon Experience—the most extensive in the industry, assures the maximum in physical properties, uniform machinability, and balance control.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

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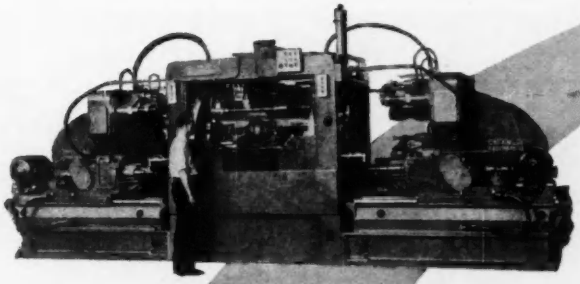
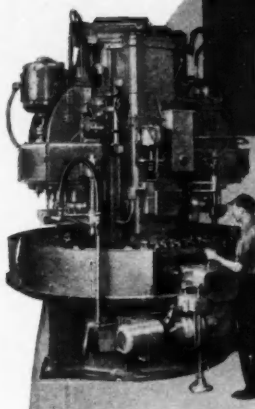
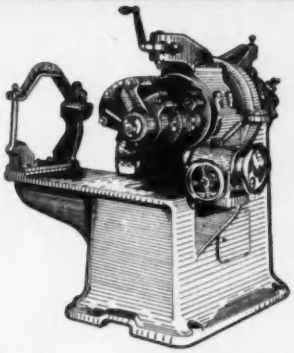
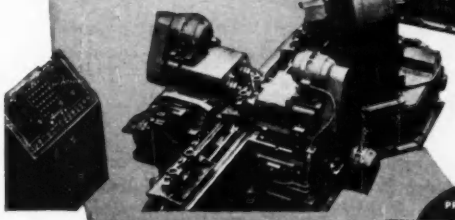


BUILDERS OF SPECIAL MACHINERY SINCE 1918

GREENLEE





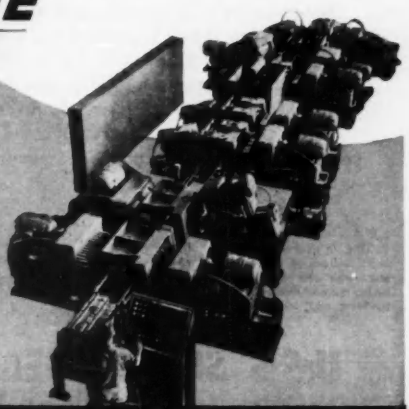


'Way back in 1918, the first Greenlee Special Machine went into operation in the tractor plant of a now famous automobile manufacturer (who still makes tractors). We've made a lot of machines since then, from small, special purpose machines performing only a few operations to huge transfer machines employing several hundred tools working in automatic, unvarying cycles. We're still making special machines... and constantly developing new methods for faster, cheaper production processes.

PRODUCTION MACHINERY

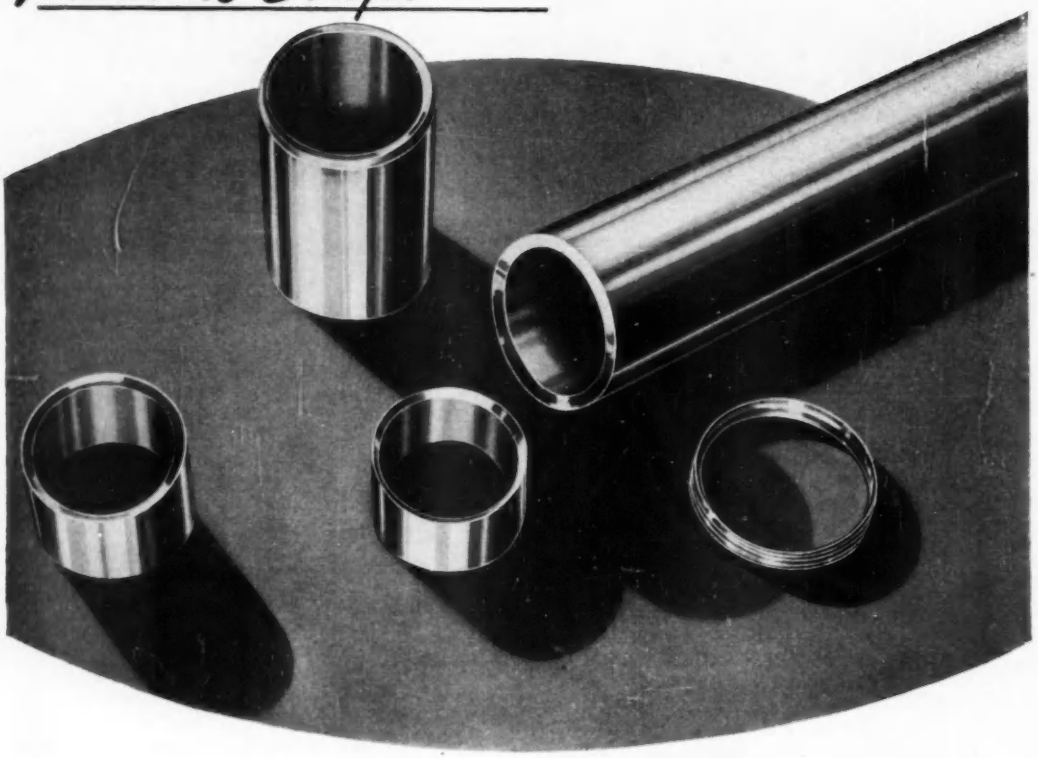
GREENLEE

GREENLEE BROS. & CO.,
1756 MASON AVE., ROCKFORD, ILL.



MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

Machine Shops:



try this solid stock with a built-in hole

● It's surprising how much it costs to bore a hole through ordinary solid stock. First, of course, is the time element. Plus tool wear. Then, add the cost of the bored out steel that ends up as scrap.

Often you can save this time and scrap and tool wear if you use Shelby Seamless Mechanical Tubing for making parts. It comes in a *complete* range of sizes, wall thicknesses, finishes and steel analyses. And the basic shape is already made.

Shelby Seamless is just the thing for volume production shops. Our precision manufacturing methods assure complete uniformity. You can be sure of identical parts whether you make hundreds or thousands of units daily.

A Shelby Seamless Tube is pierced from a solid billet of uniform steel. This manufacturing process is your assurance of uniform wall strength. In fact, Shelby Seamless is as sound as a solid forging.

For more information on this versatile tubing, write to National Tube Division, United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

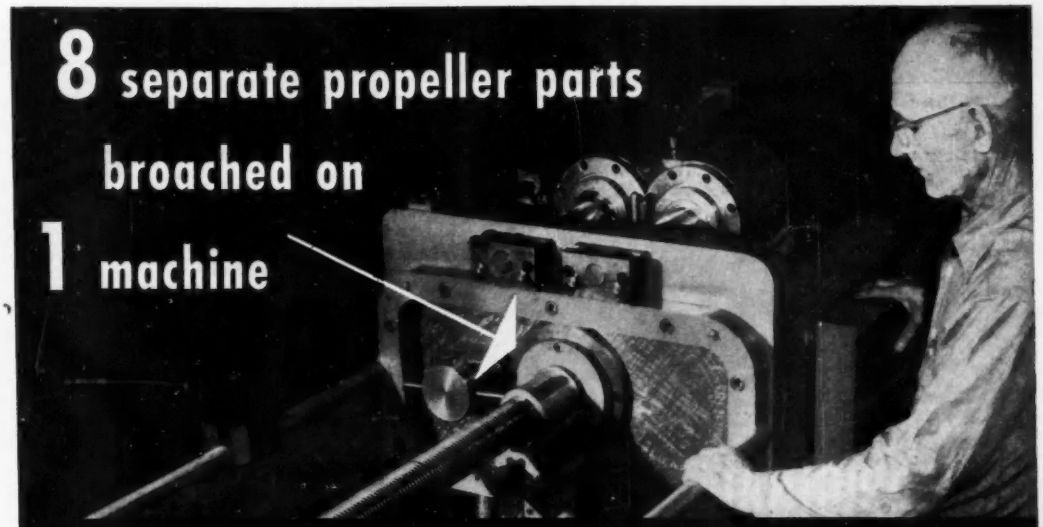
All National Seamless Tubing is pierced from solid billets of uniform steel—the one manufacturing method that assures uniform wall strength.

NATIONAL TUBE DIVISION, UNITED STATES STEEL COMPANY, PITTSBURGH, PA.
(Tubing Specialties)
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S SHELBY SEAMLESS MECHANICAL TUBING

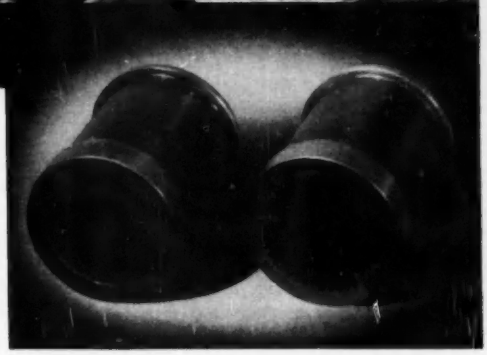
UNITED STATES STEEL

8 separate propeller parts broached on 1 machine



A PROPELLER MANUFACTURER GOT THESE BENEFITS FROM HIS AMERICAN HORIZONTAL MACHINE:

1. **Tooling is readily inter-changeable for eight separate parts of short run production.**
2. **Large parts are easily loaded and unloaded.**
3. **Double helical drive for right and left hand helix readily adaptable to machine.**
4. **The horizontal machine provided the most tonnage and stroke per dollar invested.**



To broach the propeller sleeve gears, American built and equipped a standard HDE-30-72 horizontal broaching machine with six interchangeable lead bars for different internal spline operations. The machine broaches eight different propeller sleeve gears. Number of spline teeth vary from 43 to 55 with diameters ranging from 2¾" to 3½", and with length of splines cut ranging from ¾" to 3" long. Ask American which type of machine best suits your requirements. Just send a part print and hourly requirements for our recommendations.

AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

CLEARANCE AND MARKER LIGHTS

91

Model 91 Protected . . . red or amber Fresnel lens . . . ½" sturdy steel body.

70-C

Model 70-C Streamlined, flat base . . . red or amber lens.

92

Model 92 Protected . . . red or amber Fresnel lens . . . heavy steel body.

DOME LIGHTS

38-M

Model 38-M, steel, grey enamel, toggle switch . . . flat Moonstone (translucent) lens.

38

Model 38, steel, grey enamel, toggle switch . . . convex, Holophane lens.

39

Model 39, steel, grey enamel, toggle switch . . . convex Holophane lens, special wire guard.

GIANT STOP LIGHTS

Model 44-BS diam. 8", depth 3", black enamel, chrome plated rim. Red or amber lens. 2" "STOP" fire-stained on 3" black band.

44-BS

Model 41 heavy steel, black enamel. 11½" x 3", 2½" deep. Red glass lens, "STOP" fire-stained in black.

41

DIETZ SAFETY LIGHTING AS ORIGINAL EQUIPMENT

This famous Line is backed by over 100 years of know-how in the manufacture of lighting equipment. From the earliest automobile days of Acetylene Head and Tail Lights to today's latest Direction Signals, DIETZ has been a preferred source of safety lighting original equipment among leading motor vehicle manufacturers.

All leading items in this great Line have been designed and laboratory tested to more than meet the most rigid motor vehicle requirements of every State in America, as well as the exacting specifications of the ICC, SAE and IES. Quantity production on a precision basis has been a DIETZ tradition for over a century. You can use this combination of product quality and economical production for the safety lighting equipment on your vehicles. Ask us to show you how readily DIETZ Products can be adapted to your original equipment requirements. R. E. Dietz Company, Syracuse 1, New York.

DIRECTION SIGNALS
(ALL LUCITE LENSES)

125

Model 125 Double Face Light.

Model 120 Single Face Light.

120

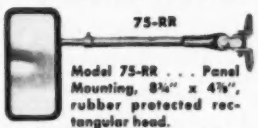
Model 130 Flush Mounting Light.

Model 111-C Self-Cancelling Switch . . . ETL tested in over 175,000 cycles of continuous operation. LIFETIME GUARANTEE—WILL NOT BURN OUT.

130

111-C

EXTENSION MIRRORS



75-RR

Model 75-RR . . . Panel Mounting, 8¼" x 4⅞", rubber protected rectangular head.

75-H

Model 75-H Mirror Head, rubber cushioned. 8¼" x 4⅞".

Model 74-HR Mirror Head, rubber protected, circular head. 5¼" overall diam.

74-HR

REFLEX REFLECTORS

86

Model 86 Flush Mounting, Oval, Assembled. 4½" x 3¼", depth ⅝", heavy steel, grey enamel. Red or amber Stimsonite Plastic Lens.

88

Model 88 Flush Mounting, Round, Unassembled. 3⅛" diam., depth ¼", non-corroding aluminum. Red or amber Stimsonite Plastic Lens.

SEALED BEAM SPOTLIGHT

Model 510-SC Universal, swivel mounting. Chrome plated, 5¾" diam. Control handle on back of light, toggle switch. Standard equipment on fire apparatus, wreckers, emergency vehicles and road maintenance equipment. Clear or red Sealed Beam bulb.

510-SC

COMING SOON!

DIRECTION SIGNALS

Slimmer, Rugged, Lightweight Bodies • Single Hollow Stud Mounting
Stimsonite Lenses • Burn-out-proof Switch Unconditionally Guaranteed
Accepted as Original Equipment by Leading Truck and Trailer Manufacturers.

WRITE FOR DETAILS

OVER A CENTURY OF LIGHTING **DIETZ**

Standard-design springless Syntech* oil seals meet space limitations in small garden tractor

In the bearing assemblies of small motorized equipments such as garden tractors, it is often difficult for a designer to find room for both the bearing and the essential oil seal. A simple and highly workable solution to this recurrent problem is found in the rotor shaft bearing assembly of the Merry garden Tiller.

In this and similar machines an excessive amount of dirt, dust and mud is always present around the rotor shaft housing. Oil seals are necessary to exclude dirt and dust while at the same time retaining heavy oil around the bearings. But as in other machines of this type, space for incorporating oil seals is at a premium.

The critical space limitations of the Merry Tiller are met and proper sealing is obtained through the use of National 340,000 series Syntech* Oil Seals. These are of springless design with precision-molded synthetic rubber sealing members on both the ID and OD. Two seals are mounted "back-to-back" at either side of the rotor shaft assembly. The outer seal excludes foreign matter; the inner seal retains S.A.E. #90 oil around the bearings. The four seals used occupy no more space than the two single-lip spring-loaded seals formerly installed.

In this application, a standard-design National Syntech Oil Seal was used at a considerable saving in tooling costs. Many sealing problems can be solved in this manner through the use of standard design seals. In other applications, special designs are required to meet special problems. In either case, National Oil Seal Engineers can bring nearly 30 years of sealing experience to the job. Why not call the nearest National engineer for help on your sealing problem?

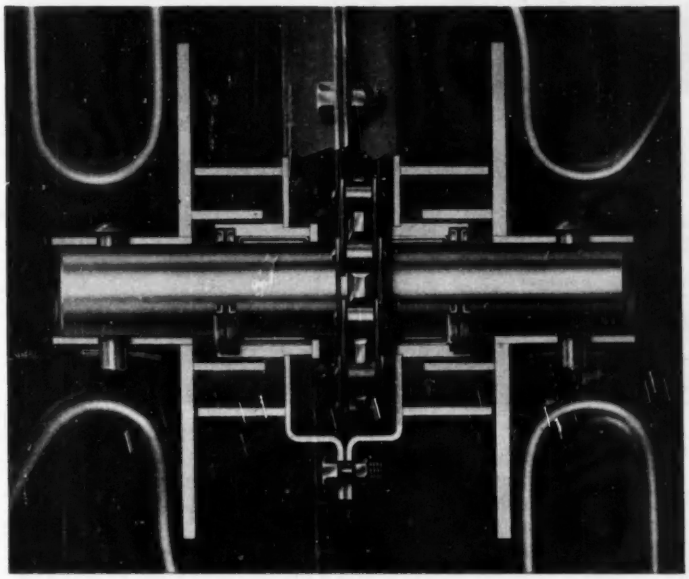


Figure 1. Rotor shaft assembly

Figure 2. Merry Tiller

Figure 3. National 340,000 Syntech* Oil Seal

* Trade Mark Registered

Announcing Alcoa Aluminum tinting paste no. 222

For Metallic Finishes That Have:

- More Glamour
- Maximum Two-Tone
- Greater Depth
- Gloss Retention
- No Seeding
- Richer Color Values

You may be noticing new richness and sparkle in the polychrome finishes of some of the new automobiles. When you do, you will be viewing another example of Alcoa's co-operative work with its paint manufacturing customers.

In a two-year search, we looked for a way to produce an aluminum tinting paste that essentially was of uniform particle size in the middle or true glamour range. Required were: freedom from oversized flakes that might cause seeding; absence of extreme fines that cloud and spoil true color values; retention of gloss, improved two-tone and glamour, and all other properties that characterize a good Metallic.

After 196 experimental batches, we found the answer. It is available to all paint manufacturers as Alcoa Aluminum Tinting Paste No. 222.

The experience and facilities which developed Albron 222 are available to assist you in furthering the application of aluminum's advantages to automotive uses. Whatever phase of your company's activities is your responsibility, you'll find an Alcoa specialist who talks your language. Call your Alcoa sales engineer for complete details of the facilities of Alcoa's Research and Development Divisions. Or write:

ALUMINUM COMPANY OF AMERICA
1841-F Gulf Building • Pittsburgh 19, Pennsylvania

ALCOA *First in Aluminum*

NOW 6:30 P.M. EDST every Sunday—"SEE IT NOW" with Edward R. Murrow . . . brings the world to your armchair . . . CBS Television

BEST... again and again!

A leading Diesel manufacturer reports:

We were getting bearing failure in 100 hours ...until we standardized on

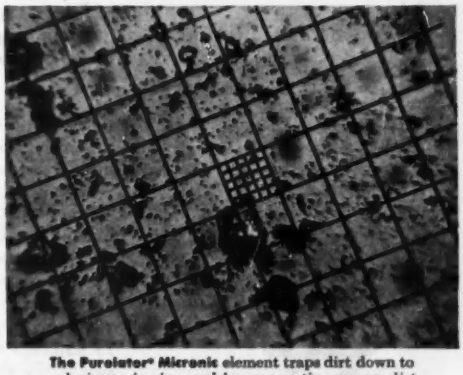
PUROLATOR

FULL-FLOW

MICRONIC FILTERS

IN SERVICE SO SEVERE that engine bearings formerly failed in a hundred hours or less—the same Diesel equipment now operates more than a thousand hours with no visible bearing wear!

This enormous increase in bearing life—this Diesel manufacturer reports—can be credited entirely to Purolator Full-Flow Micronic* filtration. Needless to say, Purolators are now standard equipment on *all* this manufacturer's Diesel vehicles and industrial engines!



The Purolator® Micronic element traps dirt down to *submicrons* in size, and has many times more *dirt storage space* than old-style filters.

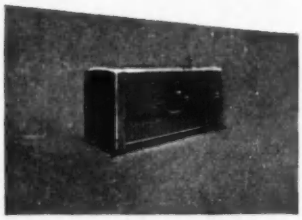
Not once . . . not twice . . . but *every time* Purolators have been tested by the world's largest and most important makers of internal combustion engines —Purolators have won top honors. No other filter is capable of delivering the high flow rates necessary for filtering *all* the oil at *each* pass—full-flow filtration—with minimum pressure drop throughout a lengthy service life. And no other filter gives dependable filtration down to *submicrons* (.0000039 in.)! The Micronic element has *ten times* the effective filtering area of old-style filters. And—size for size—no other filter provides as much *dirt storage space* as does Purolator.

Want to prove Purolator's outstanding superiority to your own satisfaction . . . on your own equipment . . . in your own way? Our Engineering Department will gladly co-operate in helping you conduct any type of comparative filter test you may prefer. Simply write, describing your equipment. *Reg. U.S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices: Chicago, Detroit, Los Angeles

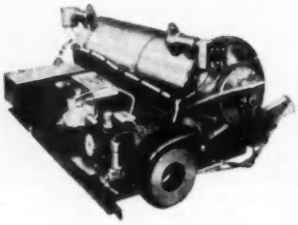
PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

if it's worth starting...



IT'S WORTH EQUIPPING WITH JANITROL

liquid heaters



If you want to make sure that a military or commercial vehicle is fully equipped to start and function over the entire range of operating conditions—right down to 65°F below zero—write *Janitrol liquid heaters* into the specifications. Recent tests under the severest operating conditions have proved beyond question that the new 90,000 Btu-per-hour capacity Janitrol liquid heaters insure positive starting without special fuel capsules—at minus 65°F after a 72-hour cold soak. On the A-2 bomber towtug, for instance, in 65°F below zero weather the engine can be started and the towtug rolling well within 30 minutes after heater is switched on—or the heater can be used to raise the engine temperature to 160°F and maintain standby warm engine and operating parts in any weather. In addition to assuring *all-weather operation* Janitrol liquid heaters extend engine life and cut maintenance by preventing sludge formation and other deteriorating effects resulting from low operating temperatures. Call your nearby Janitrol representative for prompt help on any automotive or aircraft heating requirements.

HEAT WHEREVER YOU WANT IT **Janitrol**

AIRCRAFT-AUTOMOTIVE DIVISION SURFACE COMBUSTION CORP., TOLEDO 1, OHIO

F. H. Scott, 225 Broadway, New York, N. Y. • C. B. Anderson, 2201 Grand Ave., Kansas City, Mo. • L. A. Curtis, 7046 Hollywood Blvd., Hollywood, Calif. • F. H. Scott 4650 East-West Highway, Washington, D. C. • Phil A. Miller; Frank Deak, USAF Coordinator, Central District Office, 400 Dublin Ave., Columbus, Ohio • Headquarters, Toledo, Ohio

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Electric Welded Steel Tubes

Hot and Cold Rolled Carbon Steel up to 1025 Carbon

Round
Square
Rectangular
Special Shapes

Diameters from ¼" O. D. to 4½" O. D.
Wall thicknesses from .025" to .187"

● If you require Electric Resistance-Welded Steel Tube, we suggest you get in touch with Revere at once. On many requirements, exceptional deliveries can be made. Investigate this source of supply.

Complete facilities are available for further fabrication such as cutting, swaging, bending, annealing, testing, etc.

If you are equipped to do your own fabricating, you will find Revere Electric Welded Steel Tubing has uniform properties and can be readily formed for varied applications.

Over 25 years of experience in the manufacture of Electric Welded Steel Tubes.

Technical and Engineering service is available. Consult us on your Steel Tube problems.

REVERE
COPPER AND BRASS INCORPORATED
Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

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Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

Easier, smoother break-in, longer subsequent wear

Get over the hump of break-in with the friction parts of an engine and you've got a big trouble-source eliminated. And that's one thing Parco Lubrite does—it prevents scuffing and scoring during break-in operation. The Parco Lubrite coating, non-metallic and integral with the metal, is oil-absorbent and maintains lubricant in the tight fit of new parts and so assures easy and smooth operation.

The Parco Lubrite coating promotes longer subsequent service because the parts wear in easily to close mating of parts and bearing surfaces.

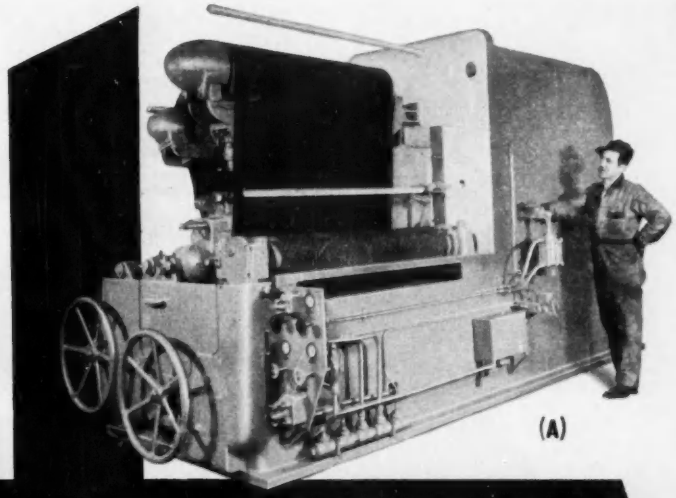
Treatment of parts with Parco Lubrite is a chemical process which produces results of uniform, high quality and operates with simplicity and efficiency.

For full information about Parco Lubrite, write for free technical bulletin.

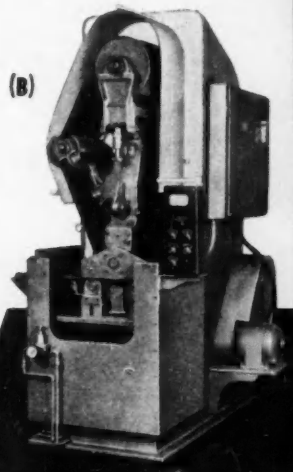
* *Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

Parker *RUST PROOF COMPANY*
2178 E. Milwaukee Ave.
Detroit 11, Michigan

BONDERITE—corrosion resistant paint base • ***BONDERITE and BONDERLUBE***—aids in cold forming of metals • ***PARCO COMPOUND***—rust resistant • ***PARCO LUBRITE***—wear resistant for friction surfaces

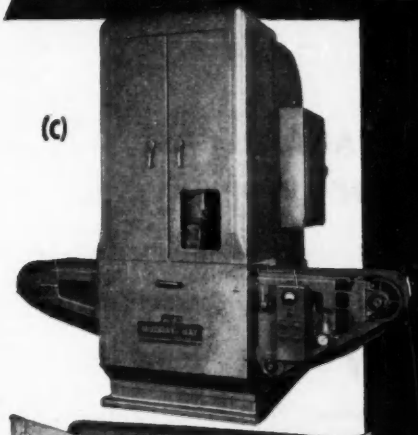


(A)



(B)

IF THE STOCK IS FLAT
MICRO-POLISH



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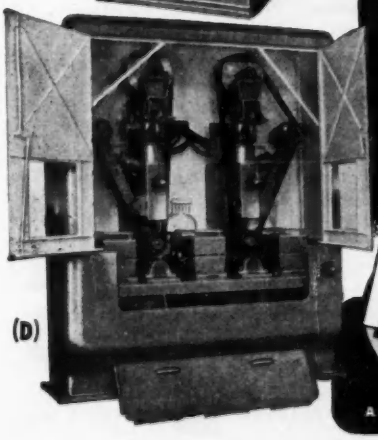


(D)

can automatically finish your job faster, better or cheaper regardless of size, shape or material.

Murray-Way, "engineered-to-the-job", Micro-Polish equipment is now being used the country over in every type of application, on every conceivable kind of material.

Micro-Polish is an amazingly versatile and consistently successful automatic polishing method useful on any job from the prepolishing of low grade steel sheet, to meet high quality job specifications, to the production sharpening and polishing of pruning tools.

Micro-Polish can precision finish any size, shape or length of sheet, strip or blanked stock in ferrous or non-ferrous metals, wood, fiber, plastic, rubber or leather, by wet or dry process.

The typical Micro-Polish equipment shown here demonstrates how Murray-Way engineers have adapted the process to individual job requirements.

A Micro-Polish giant used in reclamation grinding of steel strip.

B One of our smaller units used in polishing narrow bi-metal stock.

C A versatile unit using belt conveyor to polish a variety of flat stampings and forgings.

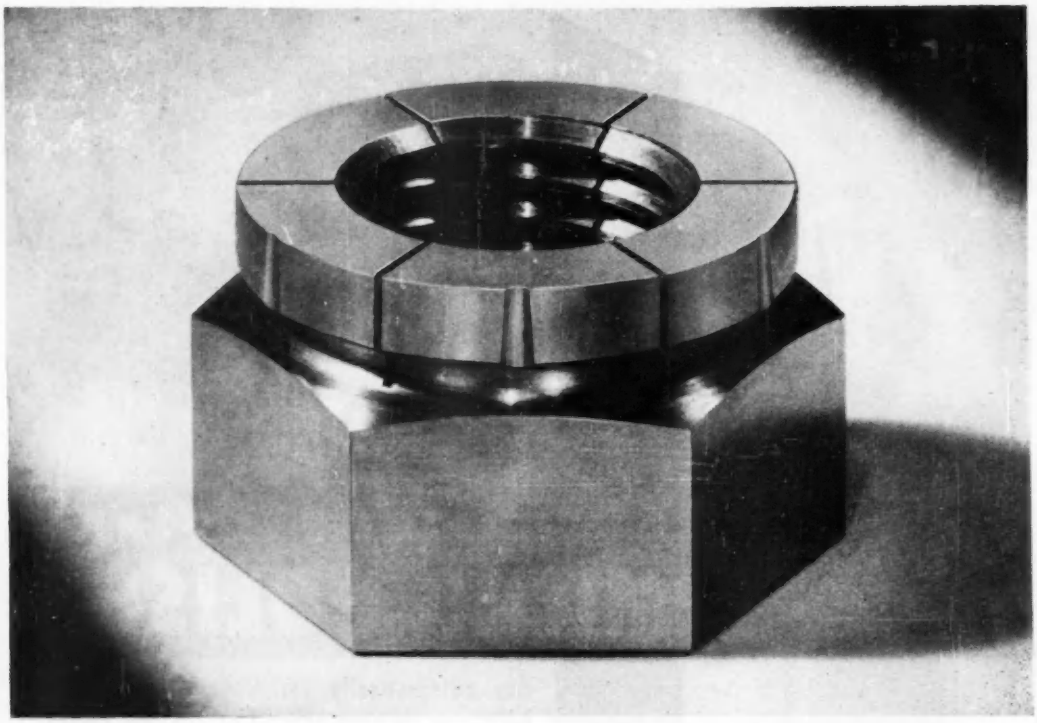
D A space saver unit for polishing flat bar stock. Two heads and two grades of belt grain accomplish the complete job without rehandling.

Murray-Way engineers will gladly show you how this time and cost saving method can improve your polishing operation.

MURRAY WAY THE MURRAY-WAY CORPORATION

POST OFFICE BOX 180 — BIRMINGHAM, MICHIGAN

AUTOMATIC POLISHING, BUFFING, GRINDING EQUIPMENT



ON COMMERCIAL CARRIERS
FLEXLOC NUTS WON'T WORK LOOSE

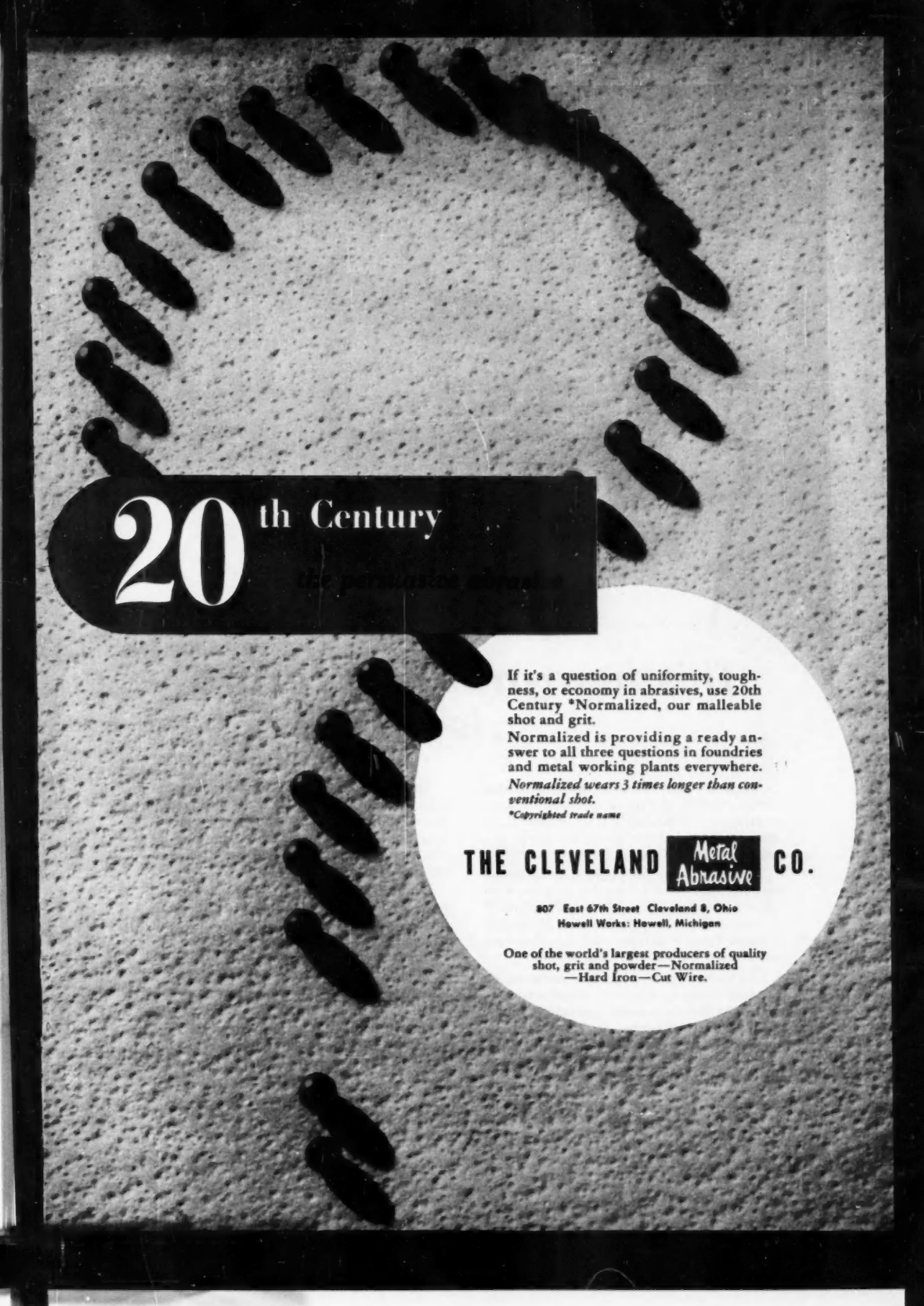
SOUTHERN COACH LINES, INC., Chattanooga, Tenn., uses FLEXLOC Locknuts to combat vibration on the motor housings, differentials, drive shafts and shock springs of its bus fleets.

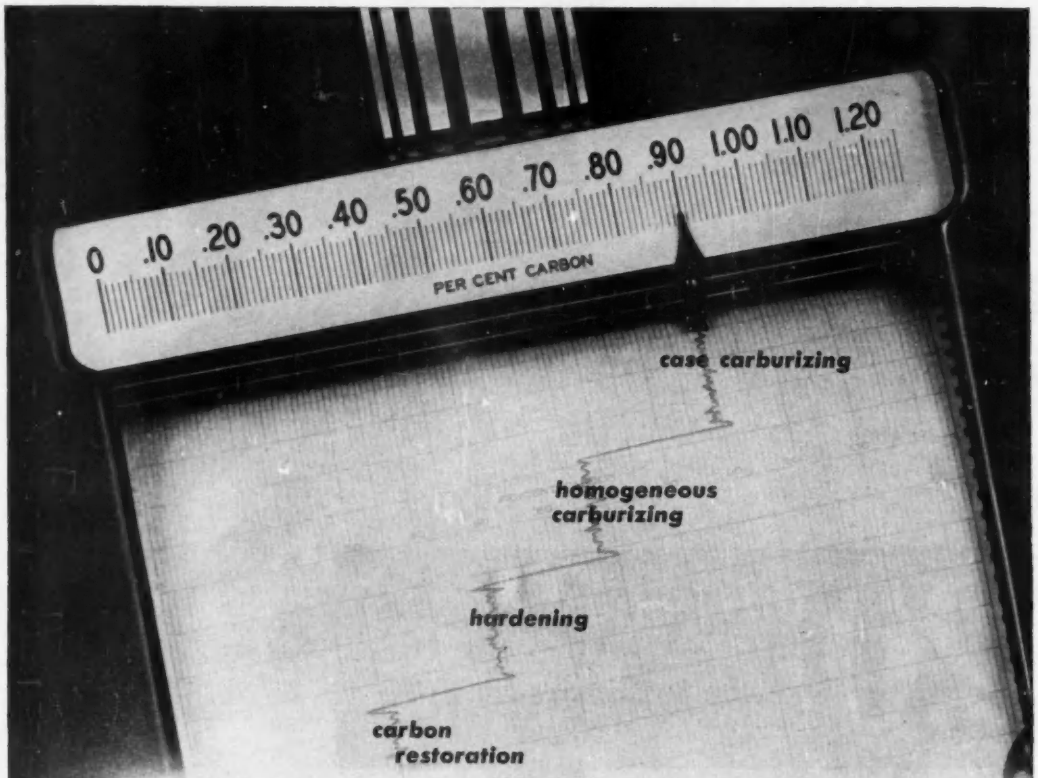
PHILADELPHIA TRANSPORTATION COMPANY, Philadelphia, Pa., has installed FLEXLOC Self-Locking Nuts on the rear axle flanges of its buses. These locknuts eliminate sheared studs, reduce maintenance, save time and money.

Write for descriptive literature and samples. Although the Government has taken almost all of our output, we'll be glad to send as many as you need to test on your equipment. STANDARD PRESSED STEEL CO., Jenkintown 53, Pennsylvania.

FLEXLOC
LOCKNUT DIVISION

SPS
JENKINTOWN PENNSYLVANIA


20th Century
If it's a question of uniformity, toughness, or economy in abrasives, use 20th Century *Normalized, our malleable shot and grit.
Normalized is providing a ready answer to all three questions in foundries and metal working plants everywhere.
Normalized wears 3 times longer than conventional shot.
*Copyrighted trade name
THE CLEVELAND Metal Abrasive CO.
807 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan
One of the world's largest producers of quality shot, grit and powder—Normalized —Hard Iron—Cut Wire.



This heat-treating record ...is NEWS

The above chart shows a record of surface carbon control during four types of heat-treating processes. During three of these operations carbon is added; during the fourth, it is accurately maintained.

This record, provided by the familiar Micromax Recorder modified for this purpose, is an exclusive feature of the Microcarb method of carbon control as applied to the Homocarb furnace. There is no other way of getting even one of these records, much less all four.

Ninety-nine out of a hundred metallurgists and heat-treaters will find this record is new... something they have never seen before. It tells them exactly what's going on...gives the heat-treater time enough to modify the process or take whatever other action is desirable. It's the NEW way to reduce rejects.

The significance of this new development will, of course, depend upon the plant setup, and must be assessed individually by the metallurgist or heat-treater concerned. However, initial users of Homocarb with Microcarb control are enthusiastic.

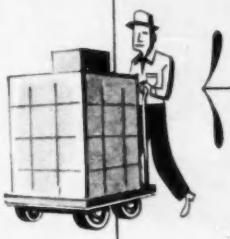
One such firm found the results so important to their customers that they featured the story in their own advertising. As more and more manufacturers become familiar with the advantages of Homocarb plus Microcarb, this equipment will soon be more generally known to men who look for the modern way to carburize.

Let us send you further facts about this new development. We may be contacted at our nearest office, or 4966 Stenton Ave., Phila. 44, Penna.

LEEDS & NORTHRUP CO.

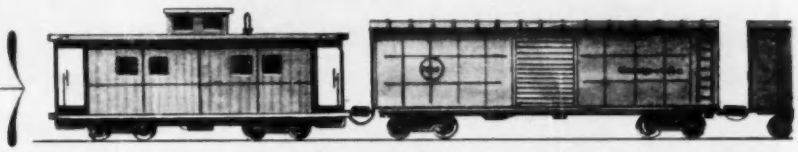
INSTRUMENTS • AUTOMATIC CONTROLS • FURNACES

Jr. Ad TD4-623(7)



Cartons...

or Carloads



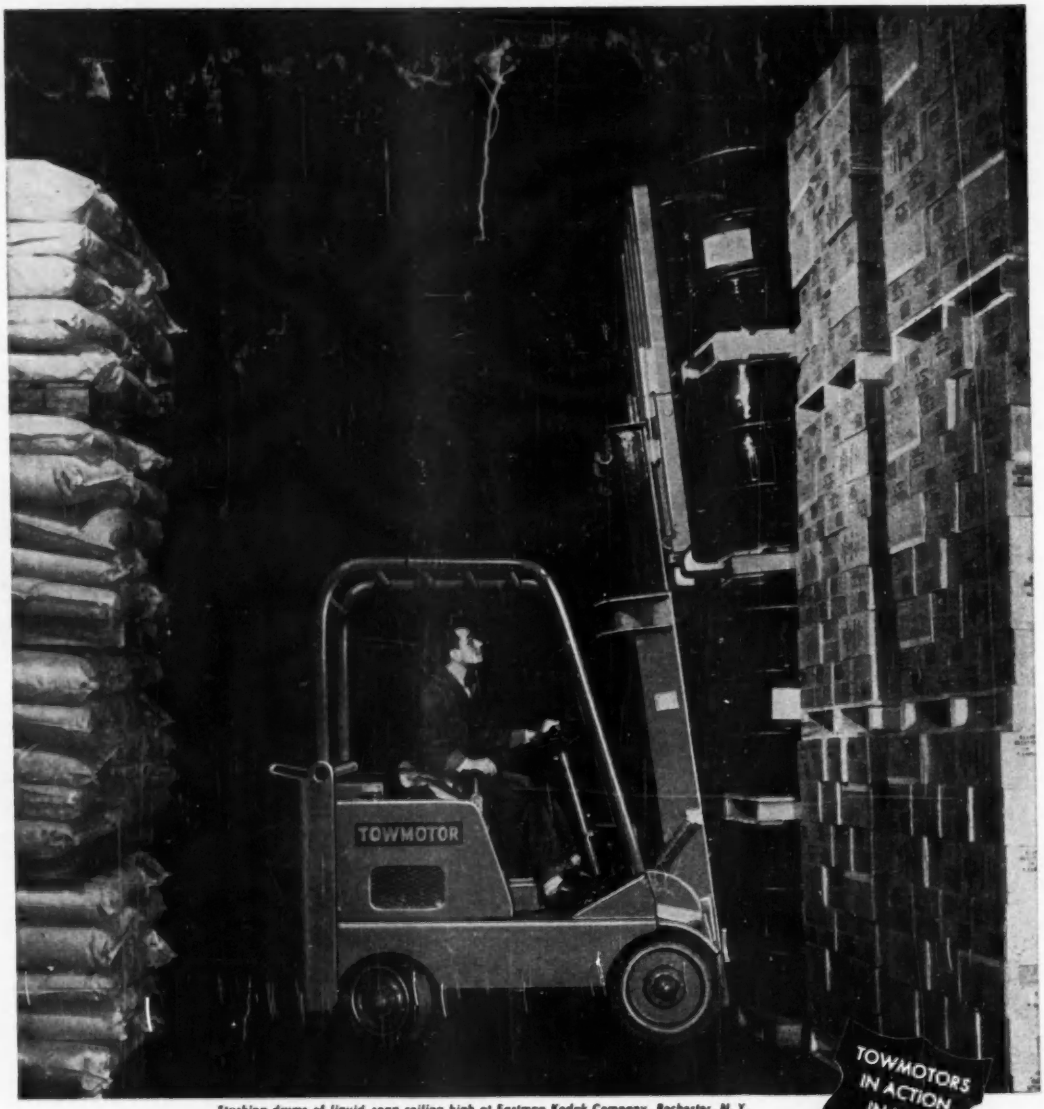
You can depend on us to meet your most *exacting* requirements for *precision* engine-bearings in small runs or mass-production quantities.

Our special skills and exclusive processes have been developed over the years to meet the challenge of today's shifting demand for automotive and industrial engines.

When you specify our engine-bearings for your production, you are selecting a manufacturer who has been a leader in the field for over 25 years.

DETROIT ALUMINUM & BRASS CORP.

DETROIT 11, MICHIGAN



Stacking drums of liquid soap ceiling high at Eastman Kodak Company, Rochester, N. Y.

TOWMOTORS IN ACTION IN U. S. INDUSTRY

use every inch...

stack to the roof, save space, double your storage area. You can do it easily, quickly, economically with a Towmotor fork lift truck. Towmotor handles all types of material. For the name of your nearest Towmotor Representative and a copy of Towmotor's tabloid size magazine on materials handling, write Towmotor Corporation, Div. 45, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS AND TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Speed Nut Savings Stories

The Glenn L. Martin Company leads the way to...

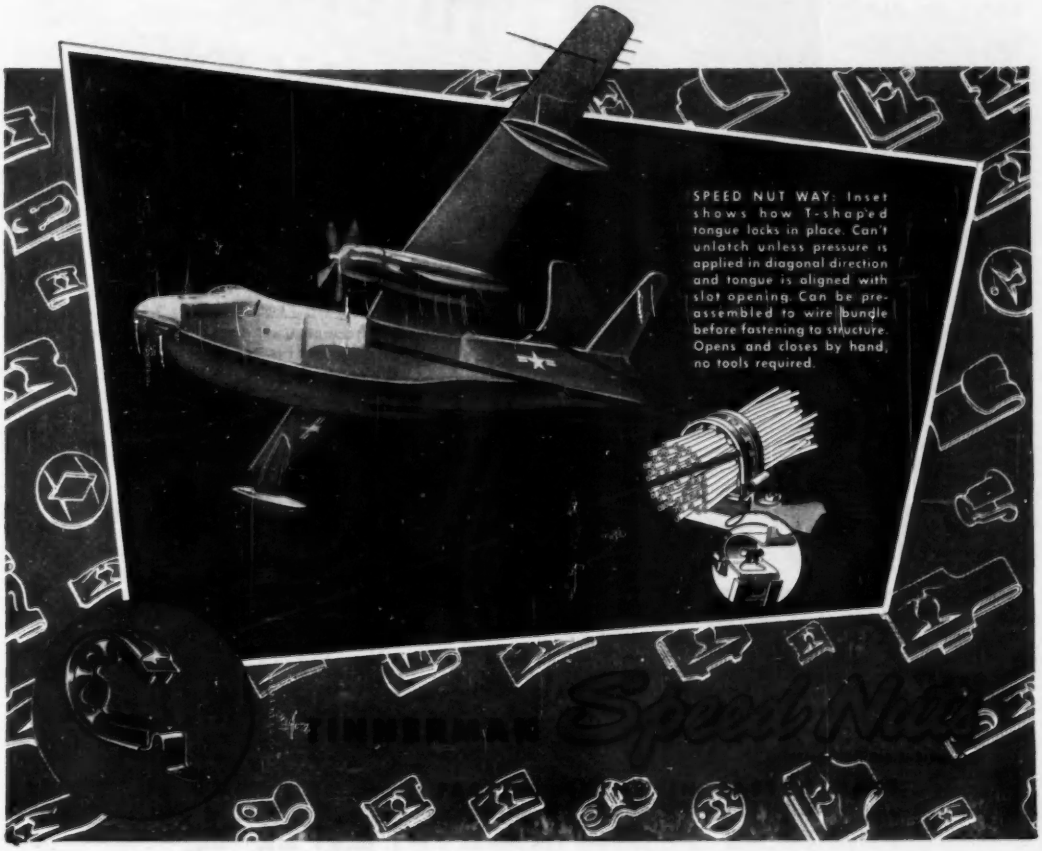
Multi-Million Dollar Savings

...FOR THE AIRCRAFT INDUSTRY WITH NEW TINNERMAN ELECTRICAL HARNESS CLAMP!

The new TINNERMAN Electrical Harness Clamp "takes off" on really big-money savings for the Glenn L. Martin Company, builder of the famous Martin Bombers. Aircraft designers and engineers at Martin found that in a quantity such as 1000 planes, a savings of $270,000 could be made... or 18 cents per clamp over former methods for 1500 clamp installations in the new Martin P5M-1 Marlin! Think of this tremendous savings in terms of the thousands of aircraft on order for building America's defenses—and you see how "multi-million-dollar savings" can be made for conversion into even greater production!

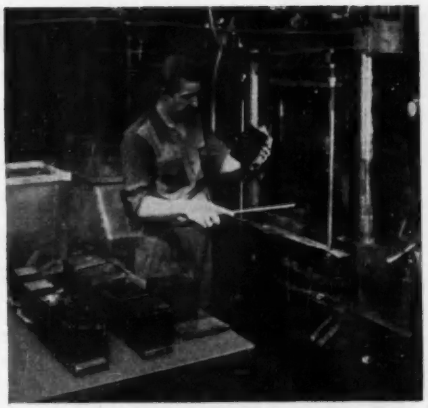
Tinnerman engineering reports this significant savings story to all American industry as another example of Tinnerman teamwork! For better fastening analysis and engineering know-how... for significant production savings no matter what your fastening problem, turn to TINNERMAN! There's a Tinnerman representative in your area to give you competent help... he'll be happy to supply details for a FASTENING ANALYSIS of your product. Meantime, write for your copy of SPEED NUT "Savings Stories": TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners, Ltd., Hamilton. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A.—7 rue Henri Barbusse. Levallois (Seine) France.

Whatever you build—from Aircraft to Clothes Dryers—Think first of Tinnerman for better fastening Engineering!



New source of plastics for the automotive industry

at United States Rubber Company's Chicago Die Mold plant



One of the 40 Plunger Transfer and Compression presses in U.S. Rubber's new Chicago Die Mold Plant.

This is the newest unit in the nationwide chain of plants and laboratories which comprises United States Rubber Company.

This modern new plant houses the productive facilities and scientific personnel for wider excursions into the field of plastics, in the form of moldings, extrusions and fabrications.

For the automotive industry, this plant will produce plastics molded by injection and compression (transfer or plunger). It has its own mold manufacturing facilities. The equipment is of the most advanced type, and the engineers have at their command the great research stockpiles of the United States Rubber Company. This Chicago Die Mold Plant will supplement the "U.S." plant and laboratory at Fort Wayne serving the automotive industry.

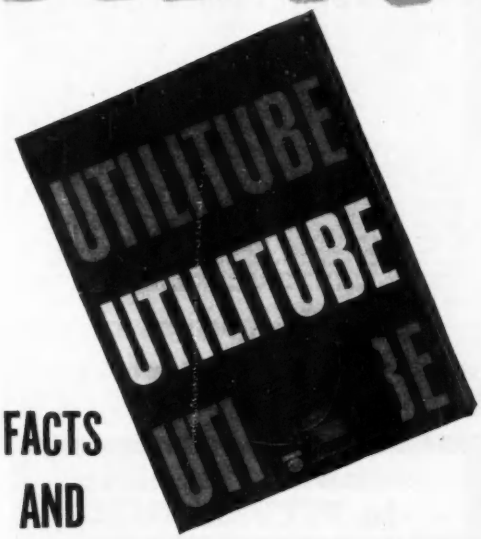
Other equipment in the plant includes 20 Injection Machines, with controlled mold temperatures.

PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

NEW

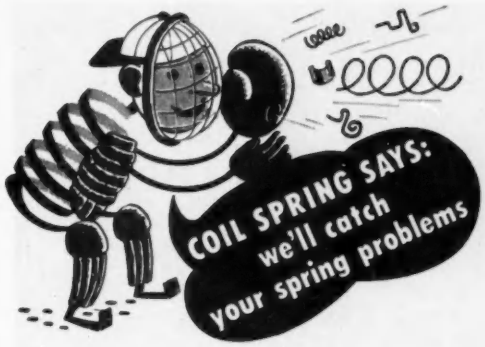


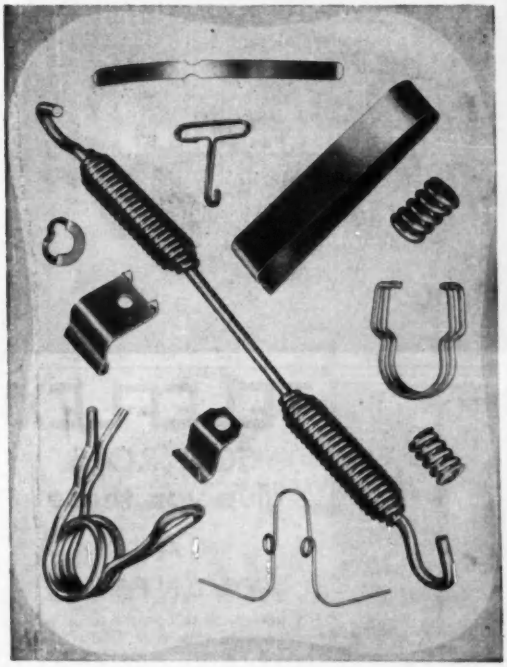
FACTS AND TECHNICAL DATA ON ALCOA'S NEW, ALL-PURPOSE COILED TUBE

Send for this new booklet describing Alcoa's new aluminum coiled tube—UTILITUBE. Alcoa UTILITUBE is designed for instrumentation, fuel, air and lubrication applications. It is easier to form, flare and bend than annealed copper. It will save you up to 40% on tube costs—gives you 3 times more feet per pound. It comes in standard 50- and 100-foot lengths and in economical, long lengths up to 1,000 feet in some sizes. And aluminum fittings are now available from leading tube fitting distributors. Write:

ALUMINUM COMPANY OF AMERICA
835-F Gulf Building • Pittsburgh 19, Pennsylvania

ALCOA



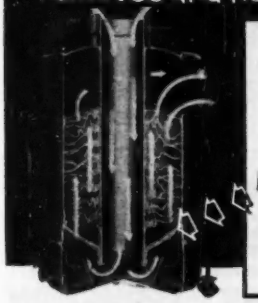


● Whether your runs are long or short every U. S. Steel Wire Spring will be exactly to your specifications. Our equipment is technically the finest available and our production and inspection standards have been proven on thousands of springs for every type of application. Pitch us your spring problems, we'll come up with the right answer!

Producing Clutch Pressure Springs
. . . Clutch Dampener Plate Springs

The **U. S. STEEL WIRE SPRING** Co.
7800 FINNEY AVE. • MICHIGAN 1-6315
CLEVELAND 5, OHIO

New Tray-Type AIR CLEANER removes and holds more dirt!



RECOMMENDED FOR HIGH-CAPACITY ENGINES on large tractors, rock crushers, power shovels, etc. Large dirt-holding capacity allows longer interval between servicing.

REMOVABLE TRAY SIMPLIFIES SERVICING. Entire tray is quickly removed for cleaning. Multiple screens prevent clogging of condensing element.

IN THIS NEW Donaldson heavy-duty cleaner, the removable multi-screen "tray" and revised oil cup design feeds more of the condensed oil back into the air stream adjacent to the center tube.

A balanced distribution of oil across the entire lower element has been achieved, eliminating both overloaded and "thin" areas.

Extensive tests in the field over a period of five years prove conclusively that the new cleaner has a higher efficiency and a greater dirt-holding capacity. We invite manufacturers to write or call for design data and test reports.

DONALDSON CO., INC. 666 Pelham Blvd., St. Paul 4, Minnesota
Donaldson Co. Ltd. (Can.), Chatham, Ont.

Donaldson AIR CLEANERS

SAFETY FILE HANDLES by Remoore

give lasting safety and surfacing clearance with no handle interference, making them ideal for die-makers—under and over handle gives complete visibility for lathe work. Files are securely held in a steel, dove-tailed V-block . . . . just drive it on—knock it off to remove. Light in weight, wooden handle absorbs moisture and oil, assuring a firm grip. Designed for lasting performance. Sizes: 6" to 16", for all Mill, Flat and Half-round files. Prices as shown.

PRODUCED TO A STANDARD OF QUALITY—NOT PRICE

OVER-TANG Vertical Handle for Surfacing

For 12" to 16" Files
Sizes as Above Weight 6 Ounces

Write today to

Remoore MANUFACTURING CO.
7310 Meyers Road Lombard Illinois

NEW MAGNA BIT HOLDER

A REVOLUTIONARY, LABOR SAVING TOOL. CUTS SCREW DRIVING COSTS 3 NEW WAYS

Hand starting or pre-positioning screws in assembly operations is *no longer necessary;* a high energy *permanent* magnet in bit chuck holds the bit and energizes it with 10 times the "pull" to hold the screw *firmly* on bit. Labor costs are cut.

Reduces bit costs through the use of super hard, low-cost interchangeable insert bits.

Reduces bit wear and replacement since the energized bit seats itself positively in the screw slot or recess.

Bit holders available for all makes of power and spiral drivers. Also super hardened tool steel insert bits for all types and sizes of screws.

Permanently Magnetic Magna-Tip Hand Screw Drivers . . . bits for all types and sizes of screws and Magna-Tip Hex Drivers for hex head screws

U. S. Patent No. 2,550,775

Write for folder 90-E, information and prices!

MAGNA DRIVER CORP.
779 Washington St. Buffalo 3, N. Y.

Courtesy Dale Plastics Corporation, Detroit, Michigan.

DE-STA-CO Toggle Clamps speed production on this simple, efficient wood turntable fixture for volume cementing of plastic fish-net floats. Twenty-four Model 210-U clamps are used to obtain quick clamping pressure. The rugged construction of De-Sta-Co clamps has permitted continuous use for over 2½ years producing 240 to 300 floats per hour. Completely retractable, they permit easy insertion and removal of work. De-Sta-Co's positive clamping pressure on the float parts makes a perfect bond and accurate assembly.

Select from over 40 models of De-Sta-Co Toggle Clamps for your work-holding problems in assembly, welding, bonding, machining or inspection of any materials. Positive holding pressures up to 4000 pounds.

Write today for your copy of the De-Sta-Co Toggle Clamp Catalog describing more than 45 stationary and portable types.

DESTACO DETROIT STAMPING COMPANY
420 Midland Ave. • Detroit 3, Mich.

Classified Advertisement

DIV. SALES MANAGERS FOR BEARING MFTR. Large basic manufacturer of automotive bearings desires the services of two divisional sales managers who have thorough knowledge of bearings. Age 25 to 40, and be free to travel extensively. Should have covered, etc. All replies will be kept in strict confidence. problems. This is an outstanding opportunity to the men who qualify. In replying, tell us all about yourself, the territories you have good working knowledge of jobber distribution and jobber Box 65, Automotive Industries, 5601 Chestnut Street, Philadelphia 39, Pa.

Index to

The Advertisers' Index is published as a convenience, care will be taken to index correctly. No allowance

Advertisers

and not as part of the advertising contract. Every will be made for errors or failure to insert.

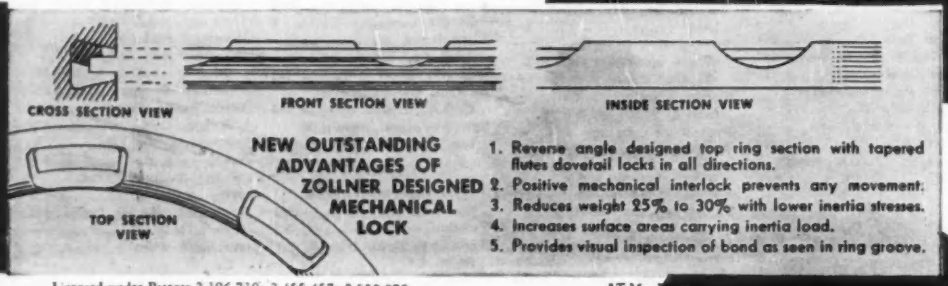
ANOTHER *new* DEVELOPMENT by ZOLLNER

Double Bonded

METALLURGICALLY Al-fin Bond

MECHANICALLY Zollner Lock

Now, another great advancement in piston design is made available to engine builders by Zollner engineers. It's the new BONDOLOC Piston for heavy duty engines where excessive top ring groove wear has been a problem. A "Ni-resist" iron groove section is *permanently* incorporated in this piston by *both* Al-fin metallurgical and Zollner mechanical bond — *double bonded and locked* to positively prevent separation failure in any service. The exclusive Zollner mechanical lock with reverse angles on every surface joining "Ni-resist" iron and aluminum provides a multiple dovetail bond which is infinitely wedge-locked. Zollner engineers invite immediate discussion of the many advantages of BONDOLOC Pistons by application to your engine.



NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK

1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

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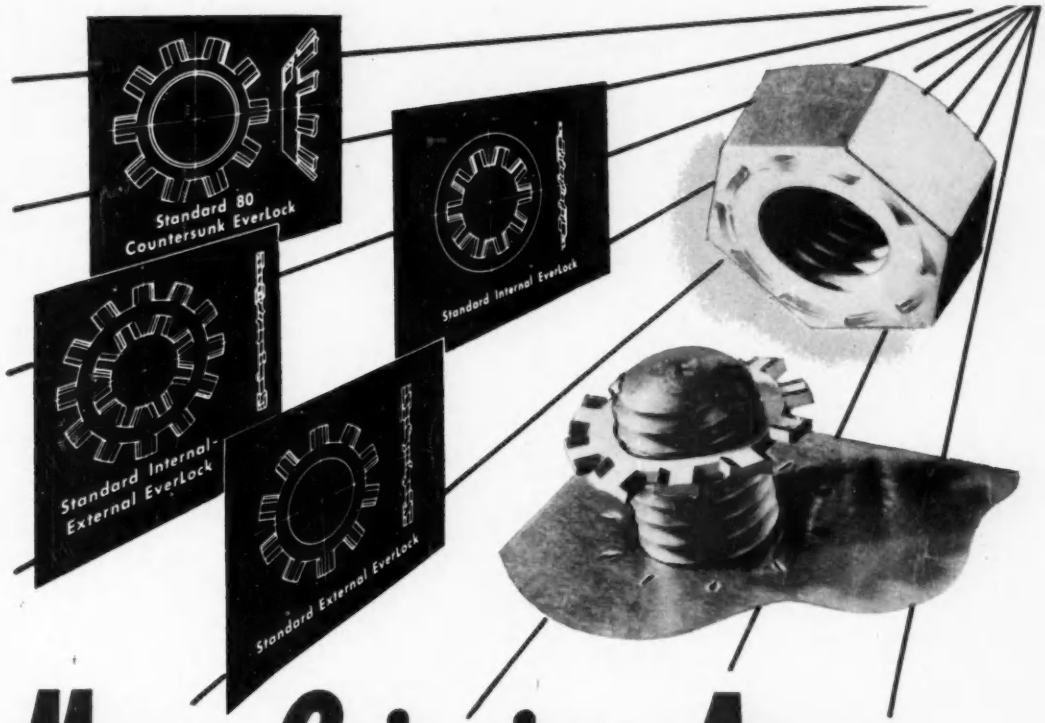

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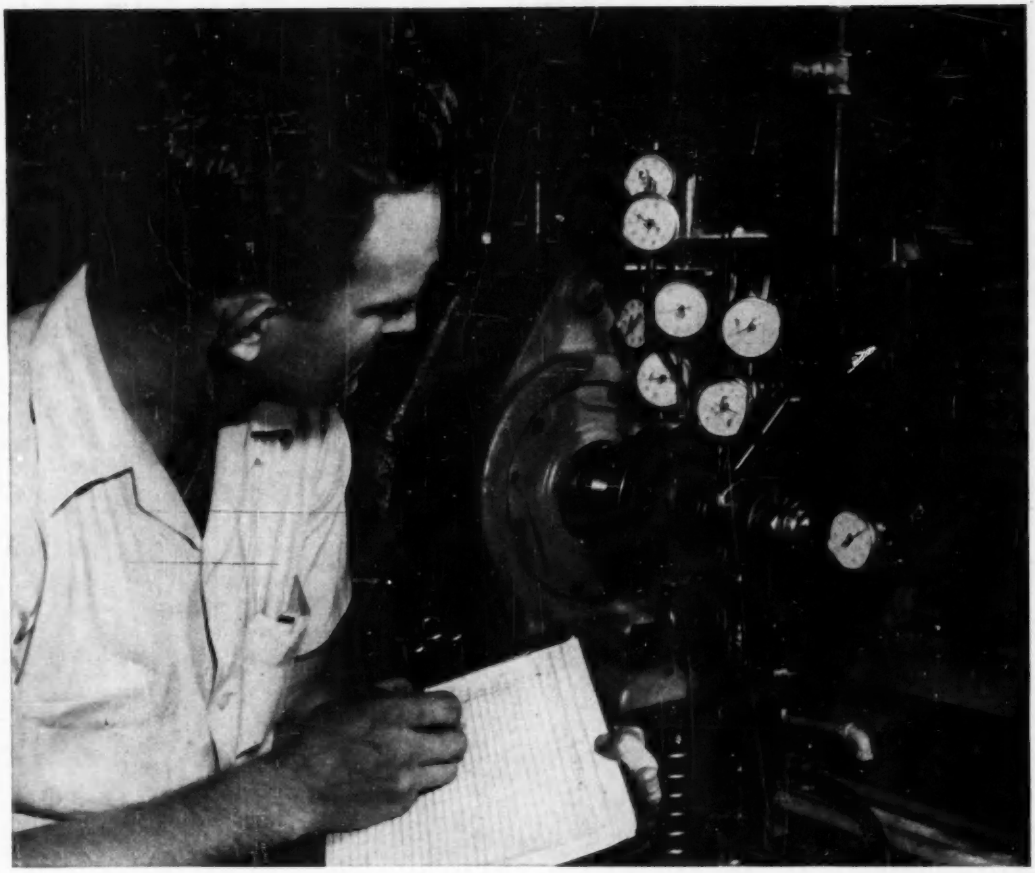

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